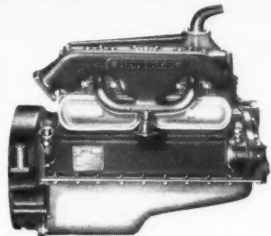


# Pit and Quarry

SAND-GRAVEL-STONE  
CEMENT-LIME-GYPSUM

## HERCULES ON THE JOB



We offer for sale but one thing—**POWER**.  
Power in varying quantity—from 20 H.P. to  
100 H.P.—but power that is certain, economical,  
easy to get, constant and **powerful**.  
It is, therefore, natural that an ever-increasing  
number of pit and quarry equipment builders are  
buying Hercules—the engine of greatest simp-  
licity of design.

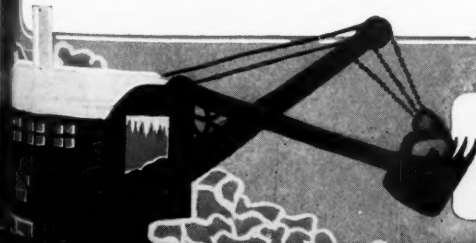
**HERCULES MOTORS CORP.,**  
Canton, Ohio, U. S. A.

**HERCULES**  
{ GREATEST SIMPLICITY OF DESIGN }  
**ENGINES**  
{ FROM 20 HP TO 100 HP }

December 15, 1925

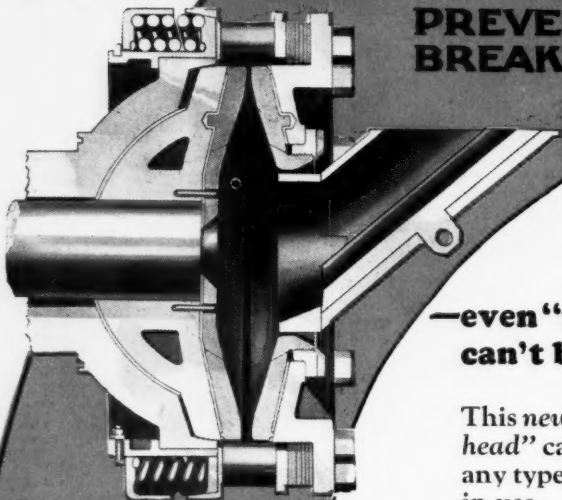
Index to Advertisers.....Page 37  
Table of Contents.....Page 39

Circulation 7,600



# SYMONS SPRING HEAD

## PREVENTS BREAKAGE



—even “tramp-steel”  
can’t break it

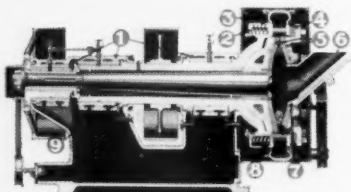
This new Symons “spring-head” can be installed on any type disc crusher now in use.

Replaces the rigid type head and provides an entirely new construction of positive protection against breakage.

Specially constructed and tempered springs exert a sufficient strength to crush all crushable material, but with yielding means to allow non-crushable material, (such as “tramp-steel” etc.,) to escape before it can cause breakage.

This one feature alone will save hundreds of dollars in repairs and time lost—our engineers will be glad to consult with you—write for more complete details.

### NEW FEATURES



#### SYMONS DISC CRUSHER

1. Choice of Bronze or Babbitt Bearings.
2. Springs guarantee against breakage from non-crushable material.
3. One-piece hood liners and segment sides proportioned for minimum waste of metal.
4. Adjustment Shims for taking up wear and changing size of product.
5. Inner and Outer Discs interchangeable. Less waste.
6. Reversible bottom.
7. Manganese Feed Spout renewable end.
8. Renewable angle wearing ring.
9. Spring oil wipers—no oil leakage.

All above parts standard except springs on head which will be furnished when desired at reasonable additional cost.

**SYMONS BROTHERS CO.**  
ORE, ROCK AND GRAVEL CRUSHERS

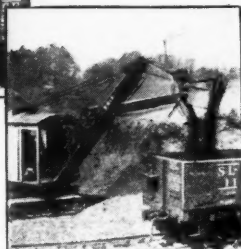
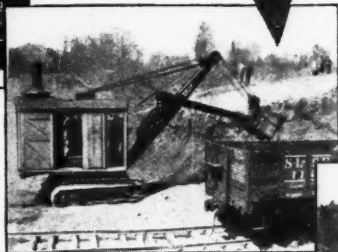
RAILWAY EXCHANGE BUILDING      MILWAUKEE, WIS.  
LOS ANGELES OFFICE      NEW YORK OFFICE  
1427 STATE STREET      100 BROADWAY  
HOLLYWOOD      NEW YORK CITY

One Continuous Spiral

CROWD  
CROWD AND HOIST  
HOIST  
HOIST AND SWING  
SWING



Operator can use the full power of the crowding engines while the hoisting throttle is wide open—and instead of stealing power from the hoist, *extra power is added.*



Swinging begins when the dipper is almost filled—before the hoist is completed. The two motions blend right together in a spiral.

And the swing is *smooth*. Quick and easy, it stops without a jar—stops just as smoothly as it starts. The operator spots the dipper right where he wants it—quick.

There is extra yardage on every kind of digging, when the ERIE'S three sets of independent direct-connected engines are doing the work.

Instant throttle control of every motion. No waiting for reversing friction clutches to take hold or let go with a jerk. No system of gears, shafts and clutches running all the time, wasting power and wearing fast.

The ERIE'S *direct throttle control* is piling up extra profits in hundreds of quarries.

The right digging principle, backed up by *reliable* construction. That's why there are more than 3,600 ERIES now in service.

**ERIE STEAM SHOVEL CO., Erie, Pa., U. S. A.**

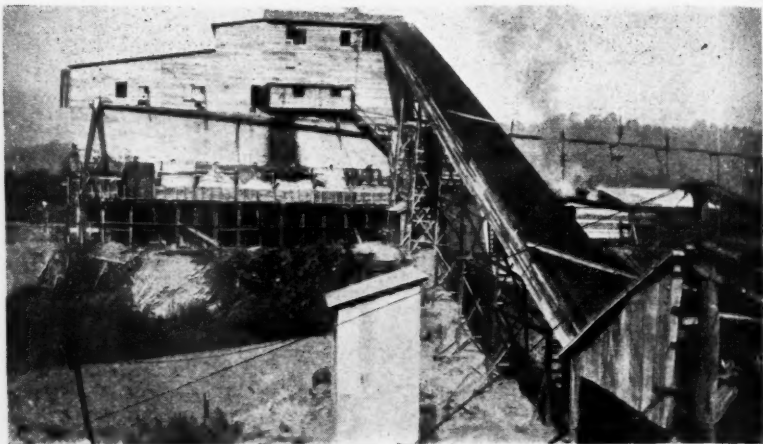
Builders of ERIE Shovels, Cranes, Ditchers, Draglines, Trench Hoes, etc.

Branch Offices: Boston, New York, Philadelphia, Pittsburgh, Atlanta, Chicago

Representatives throughout the U. S. A.

**ERIE** Revolving Shovels





**LAST YEAR** WE TOLD YOU OF THE SAVINGS STRENES WOULD MAKE IN YOUR PLANT

**THIS YEAR** THE PLANTS USING STRENES WILL TELL YOU WHAT IT HAS DONE AND IS DOING FOR THEM.

The Advance Foundry Co.  
Dayton, Ohio.

October 24, 1925

Gentlemen: In reply to your inquiry as to the wearing qualities of Strenes Metal we wish to say that we placed our metal in service in the stone chute about the first of May, 1925, and at the present time can see no material wear. It looks as though it will last for at least four (4) more years.

Prior to using Strenes we used  $\frac{1}{4}$ " black steel chute lining and it always gave trouble the first year.

WILLEY-RUCKSTUHL COMPANY.  
By: Edwin W. Ruckstuhl.

**HOW MUCH PATCHING, REPAIRING AND RELINING  
WILL YOU DO IN THE NEXT FOUR YEARS?**

*WRITE FOR CATALOGUE 26-P AND FORGET CHUTE TROUBLES*

*For further proof of the wearing qualities of Strenes, watch page four  
in each issue*

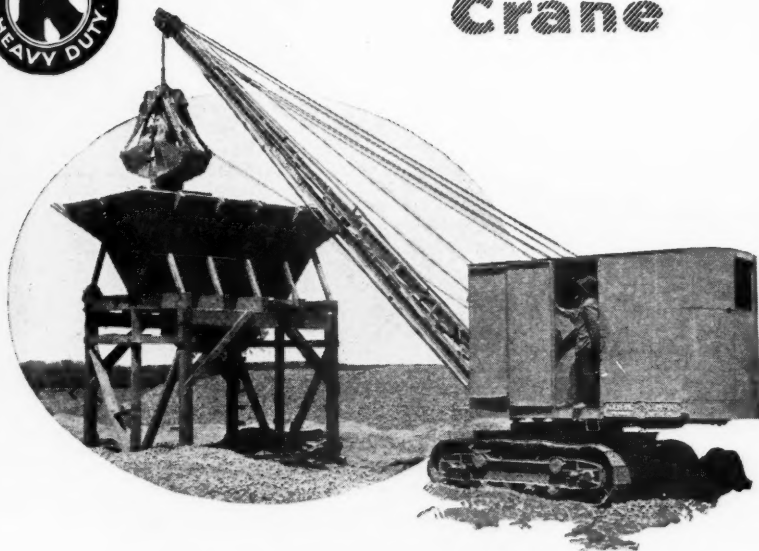
**STRENES CHUTES AND CHUTE LINERS  
LONGER WEAR—NO REPAIRS**

**THE ADVANCE FOUNDRY COMPANY** Dayton, Ohio

# KOEHRING



## Crane



## Easy Control Means Speedy Action! Capacity!

**T**HE operator handles the Koehring Crane with his fingers — not with his weight! He can shift the levers with light pressure! Pedals are as easy! Double outside-band friction clutches make control easy. Operator maintains top capacity every minute of the day. Besides, easy control gives zip and speed to every function.

Booming and hoisting may be combined in one operation instead of two stop-and-go operations. The Koehring is designed for it. No excessive wear!

Koehring heavy duty construction is the soundest value you can buy in a crane. It is the distinctive value in the crane field.

Write for Crane Bulletin Cr 32

## KOEHRING COMPANY

PAVERS--MIXERS--GASOLINE CRANES, DRAGLINES AND SHOVELS  
MILWAUKEE, WISCONSIN

Sales Offices and Service Warehouses in all principal cities

Foreign Department—Room 1370, 50 Church St., New York

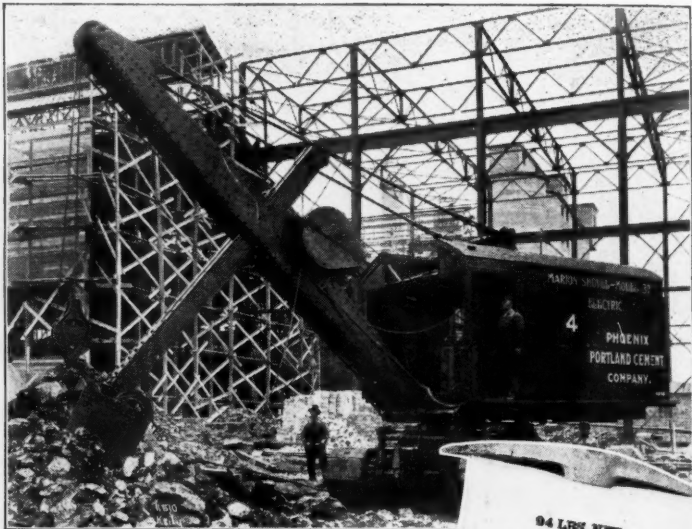
Canada—Koehring Company of Canada, Ltd.,  
105 Front Street, East, Toronto, Ontario.

Mexico—F. S. Lapum, Cinco De Mayo 21, Mexico, D. F

### Crane Capacities

No. 1—1 cu. yd. clamshell bucket on 40 or 45 ft. boom. Lifting capacity, 10 tons at 12 ft. radius. 4 cylinder, 5x6 in. gasoline engine, 1,000 R.P.M.

No. 2—1½ cu. yd. clamshell bucket on 45 or 50 ft. boom. Lifting capacity, 15 tons at 12 ft. radius. 4 cylinder, 6x7 in. gasoline engine, 925 R.P.M.



## Phoenix and Marions

"STONE is loaded into all-steel dump cars," says *Rock Products* in describing operations at the Nazareth, Pa., plant of the Phoenix Portland Cement Co., "by two Model 37 Marion shovels. These are of the full-revolving type, caterpillar tread, and are electrically operated."

The progressive Phoenix Co. finds it pays to use  $1\frac{3}{4}$  cubic yard shovels for  $1\frac{1}{4}$  cubic yard work.



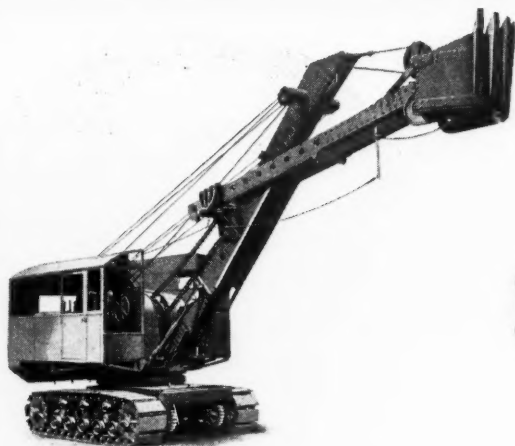
Get your copy?

Bulletin 314, printed in three colors, describing the world's largest shovel—Model 350—is off the press and ready to mail. A copy will be sent free on request.

Every hour of the day is utilized for actual work with the Model 37 Electric. You save anywhere from 10% to 25% in actual operating hours; translated into dollars, means upward of \$10.00 a day.

The Marion Steam Shovel Company · Marion, Ohio, U.S.A.

# Marion Power Shovels



# The P & H 207

## A Powerful 1-Yard Shovel for Quarry Service

THE powerful P & H crowding motion backed by a 70 hp. gasoline motor gives the big 207 unusual digging capacity. On the dependable P & H corduroy traction, this machine has proven its worth where the service is most severe. Yet with the power clutch control, it is as easily and quickly operated as the smaller shovels.

Strength and quality are indicated by such features as the cast steel revolving frame, the alloy steel heavy duty gears, elimination of chain drives, the external band brakes, extreme accessibility, and provision for

braking on either or both corduroys so that no chocking is required.

For greater output—lower maintenance—and longer years of service—put a P & H to work in your quarry.

Bulletin 82-X gives all details—let us mail you a copy.

HARNISCHFEGER CORPORATION  
Successors to

PAWLING & HARNISCHFEGER CO.

Established in 1884

3851 National Ave., Milwaukee, Wis.

New York, Jacksonville, San Francisco, Minneapolis, Memphis, Philadelphia, Birmingham, Kansas City, Chicago, Los Angeles, Dallas, Pittsburgh, Detroit, Portland, Seattle, Richmond.

Warehouses and Service Stations: Philadelphia, Memphis, San Francisco, Los Angeles, Jacksonville, Seattle



# SHOVELS

Gasoline - Diesel - Electric

# BUDA *for* POWER

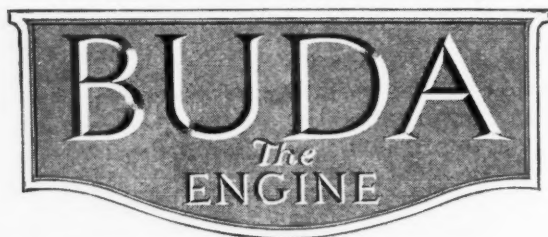
The Buda engine of today is the mature product of 44 years of combined engineering and manufacturing experience.

We manufacture complete Power Plants from 20 H. P. to 90 H. P.

Our corps of Industrial Engineers will gladly assist you in getting the best application of Buda Power to your product.

THE BUDA COMPANY, HARVEY CHICAGO  
SUBURB ILLINOIS  
ESTABLISHED 1881

*Buy only genuine Buda Parts for your Buda engine*







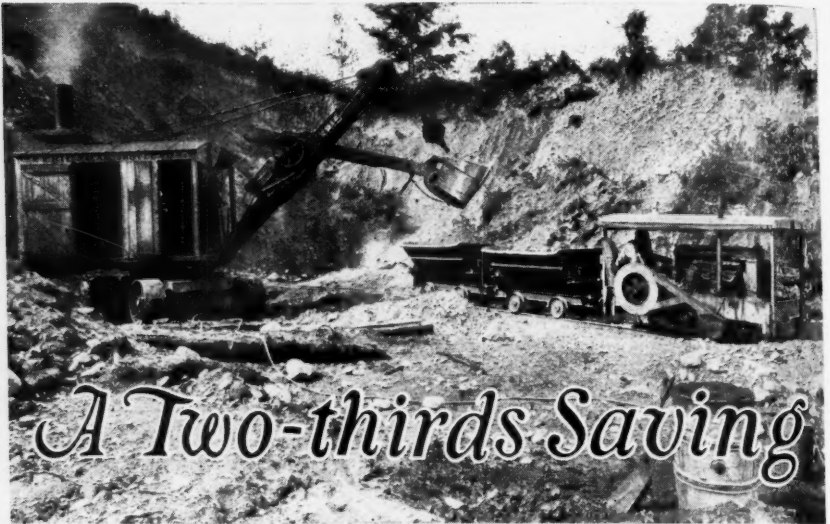
# The MASSILLON Moves Mountains

You cannot appreciate  
the hourly capacity of the  
Modern Massillon until  
you have seen it in oper-  
ation.

THE RUSSELL & COMPANY  
BUILDERS MASSILLON, OHIO

*The* **MODERN**  **MASSILLON**

Steam — **3/4 — 7/8** — Shovel  
RANGE



## *A Two-thirds Saving*

### **THIS BROOKVILLE LOCOMOTIVE HELPED TO SAVE TWO-THIRDS ON HAULING COSTS**

Among the numerous expressions of satisfaction received concerning Brookville Locomotives there happens to be an occasional one of more than ordinary significance. Note for instance the following, in which are presented some interesting facts:

Gentlemen:

The matter of getting material from the face of our gravel pit to the hopper for conveying to our screening plant has been a problem fraught with considerable difficulty and expense. At the beginning of our present season, after much study, we decided to purchase a Brookville Locomotive and the necessary cars.

The locomotive has performed perfectly, hauling on an average of 500 cubic yards per day and the cost including labor, track repairs, fuel, oil and depreciation, has been less than one-third the cost of methods previously employed.

We heartily recommend the Brookville locomotive in combination with a Fordson tractor.

Very truly yours,

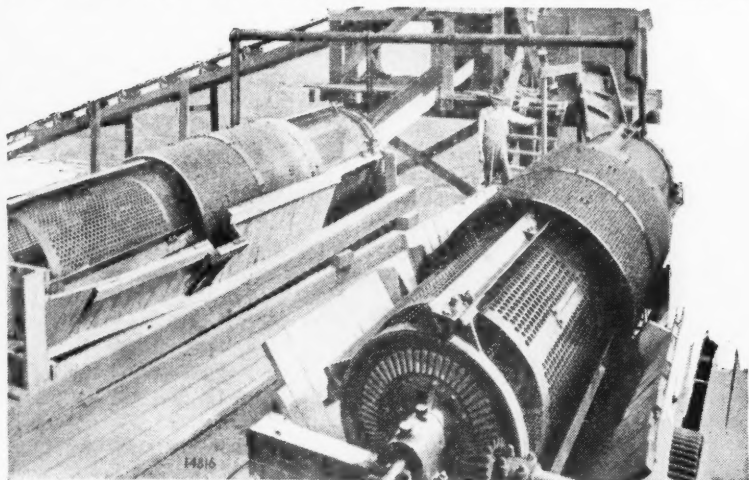
**BERNARD L. McDONALD CO.**

(Signed B. L. McDonald,  
Treasurer.

Let us send you specifications, prices and full information.

**BROOKVILLE TRUCK & TRACTOR COMPANY**  
Brookville, Pa., U. S. A.

## Jeffrey Improved Revolving Screens for Washing and Separating Sand and Gravel



ILLUSTRATIONS show a recent installation at the Jackson Pike Sand and Gravel Company, Columbus, Ohio, using two 48" Jeffrey Improved Revolving Screens for the efficient washing and screening of sand and gravel.

### Equipped with—

Large scrubbing sections with high pressure spray pipes entering screen at both ends.

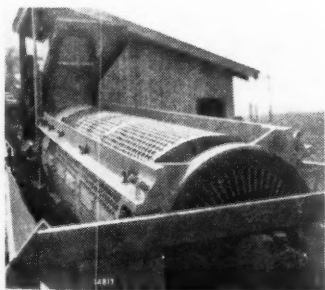
Easily changeable screen plates.

Substantial end castings.

Large trunnion rollers and bearings.

Separate renewable drive parts.

Complete plant investigations and designs made by Jeffrey Engineers of wide experience. Tell us about your local conditions.



Scalper Screen at the above plant. Parts interchangeable with washing screens.

The Jeffrey Mfg. Co., 917-99 North Columbus, Ohio  
Fourth Street

# JEFFREY

MATERIAL HANDLING EQUIPMENT



order

**ERA**  
*Manganese Steel Castings*

***To Resist Abrasion***

Manganese Castings depend for uniformity on accurate pattern design to allow for shrinkage, on proper pouring temperature and on correct heat treating.

There is no substitute for this knowledge but EXPERIENCE, and the makers of ERA Manganese Castings have had forty years of this experience.

Buy from a company that possesses the Record and Pride of achievement.

**HADFIELD-PENFIELD STEEL CO.**  
 Bucyrus, Ohio

**MANGANESE STEEL**  
  
 THE FIRST - STILL LEADS IN QUALITY

**A STANDARD QUALITY AT A STANDARD PRICE**

*The Shovel powered with Waukesha "Ricardo Head" Engine*



## LIFTING a RAILWAY with a WAUKESHA MOTOR

Over in Troy, New York, this Waukesha powered Shovel, masterfully uprooting street railways, proves five things to every shovel operator—(1) Tremendous power available, (2) flexibility of steam, (3) fuel, the kind available at any filling station, (4) water only required for cooling, and (5) absolute reliability.

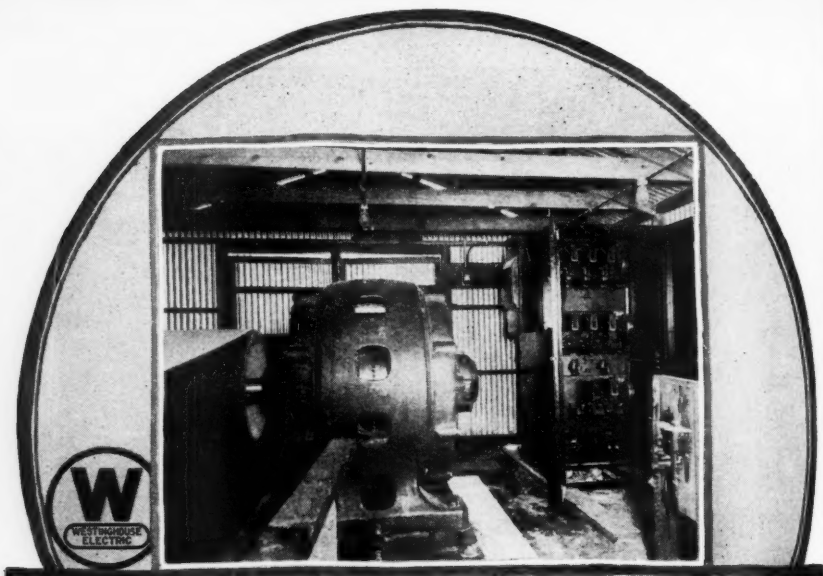
*Waukesha "Ricardo Head" Industrial Units may be obtained in five sizes varying from 15 to 100 H. P. "Two New Waukesha Units" is an interesting book about them. Write for it.*

## WAUKESHA MOTOR COMPANY

Waukesha, Wisconsin

New York      Kansas City      Denver      Tulsa      Houston  
 Aeolian Building      V. L. Phillips Co.      Wilson Machy. Co.      C. F. Camp Co.      Portable Rotary Rig Co.

*Exclusive Builders of Heavy Duty Gasoline Engines for Nearly Twenty Years*



## They "Stand the Gaff"

**S**OME Westinghouse motors have been in continuous and successful operation for twenty-five years, with not a penny spent for repairs. Yes, these are exceptional performances, yet many Westinghouse motors have operated continuously for periods of fifteen and twenty years without needing repairs. Such performance is not a matter of mere luck.

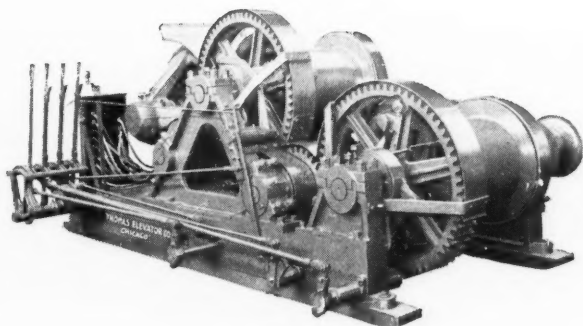
Westinghouse motors are built to successfully withstand hard treatment—shocks, vibration, dust, dirt, dampness—that's why they stand the gaff.

Present designs embody efficiencies much greater than in those previously built, with the retention of all good qualities that contributed to the long life of their sturdy pioneer forerunners. It will pay you to specify Westinghouse motors.

Westinghouse Electric & Manufacturing Co.  
East Pittsburgh, Pennsylvania  
Sales Offices in All Principal Cities of  
the United States and Foreign Countries

# Westinghouse

X 85767



THOMAS HOISTS for Sand, Gravel and Stone Producers are specialized hoists—the results of many years of experience. They are designed and built to produce maximum tonnage with minimum expense. They are made in single and two speed types, electric, gasoline or steam power, for Dragline Cableways, Drag Scrapers, Derricks, Suction Dredges and Car Haulage.

The hoist is a very important part of your plant—the best is the cheapest in the long run. May we have an opportunity to tell you more about the THOMAS HOIST?

THOMAS ELEVATOR  
COMPANY

21 South Hoyne Ave., Chicago

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---

# THOMAS HOISTS

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# Wilf

*—The shovel with a*

**One man control. Speedy movement from one operation to another.**

**Twenty-seven National Distributors carrying standard parts for replacement.**



## Wilford Power

William Fol

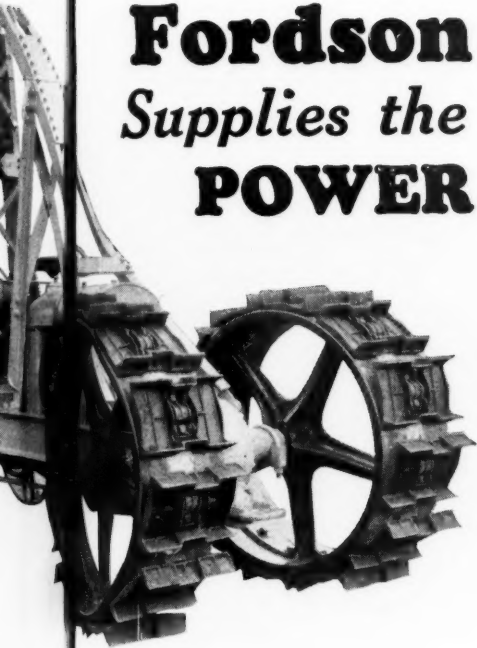
15841 Second Boulevard



# Ford

with a background—

**Fordson**  
Supplies the  
**POWER**



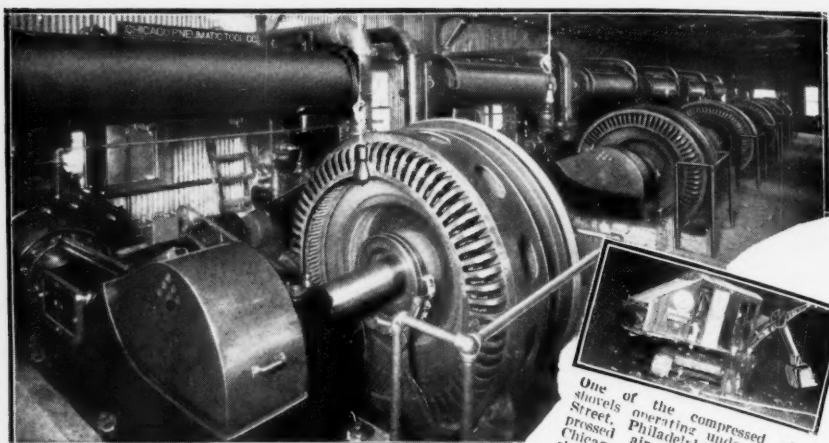
Can be used in batteries of four or five where a large shovel will not go.

Handles more than one quarter yard five times per minute.

**Shovel Company**

m Fox President

Detroit, Michigan



One of the compressed air shovels operating under Broad Street, Philadelphia, on compressed air supplied by the Chicago Pneumatic compressors shown above.

## CP Compressors On the Philadelphia Subway Job

The six direct-connected electric motor driven Chicago Pneumatic Compressors shown above are supplying 10,000 cu. ft. air per minute at 120 pounds pressure for operating air shovels, rock drills and clay diggers on the Philadelphia Subway contract, Patrick McGovern, Inc., Contractors.

The efficient 24-hour service being rendered by these six compressors is typical of the satisfactory results obtained wherever CP Compressors are

installed. Automatic regulation, self-lubrication and Simplate Valves insure steady, economical operation from CP's on every job where there is need for stationary or portable compressors.

Chicago Pneumatic Compressors are supplied in all sizes in steam, oil, belt or direct-connected motor driven types to meet all requirements.

Write for Bulletins containing full information.

## Chicago Pneumatic Tool Company

6 East 44th Street, NEW YORK, N. Y.

Sales and \*Service Branches all over the World.

*Birmingham	El Paso	Richmond	*Brussels	*Johannesburg	*Montreal	Seoul
*Boston	*Houston	Salt Lake City	*Buenos Aires	Kobe	Osaka	Tampico
*Chicago	*Los Angeles	*San Francisco	Calcutta	*London	Ostia	Timmins
*Cincinnati	*Minneapolis	*Seattle	Dairen	Manila	*Paris	Tokyo
*Cleveland	*New Orleans	*St. Louis	*Durban	*Mexico City	Rio de Janeiro	*Toronto
Dallas	*New York	Tulsa	*Havana	*Milan	*Rotterdam	*Vancouver
*Denver	*Philadelphia	*Berlin	Helsingfors	Moncton	Santiago	*Winnipeg
*Detroit	*Pittsburgh	*Bombay	Honolulu	*Montevideo	*Sao Paulo	

Canadian Pneumatic Tool Company, Ltd., Montreal, manufacturers of Chicago Pneumatic products in Canada  
Consolidated Pneumatic Tool Company, Ltd., London, manufacturers of Chicago Pneumatic products in England

BOYER PNEUMATIC HAMMERS · LITTLE GIANT PNEUMATIC AND ELECTRIC TOOLS  
CHICAGO PNEUMATIC AIR COMPRESSORS · VACUUM PUMPS · PNEUMATIC HOISTS  
GIANT OIL AND GAS ENGINES · CHICAGO PNEUMATIC ROCK DRILLS · COAL DRILLS

# CHICAGO

Depend Upon



# PNEUMATIC

That Name

## Significant Features of the Vulcan Gear Drive Gasoline Locomotive

- 1—No chains or sprockets of any kind.
- 2—All gears running in oil.
- 3—Cast Steel Open Bar main frames, permitting of accessibility for inspection and adjustments of underneath details.
- 4—Driving wheels connected up and driven by side rods as in steam locomotive practice.
- 5—Rolled-steel tires on cast-iron wheel centers, necessitating changing tires only when wheels are worn.
- 6—Constant mesh-jaw type transmission with gears always in mesh, thereby eliminating stripping of gears and insuring easier and quicker changes without loss of speed with each shift.
- 7—Spring buffer and draft rigging arrangement in bumpers for taking up shocks of coupling and strains in pulling and pushing cars.
- 8—Springs of the semi-elliptic type with provision made for 3-point suspension as in steam locomotive practice.
- 9—Fully enclosed cab with sliding doors and adjustable windows, affording comfort in all kinds of weather.
- 10—Convenient distribution of control levers for hand and foot operation.

### Vulcan Products

Hoists,  
Electric and Steam  
Locomotives,  
Steam, Gasoline, Electric  
Rotary Kilns, Dryers, Coolers and  
Roasters  
Fairchild Double-Discharge  
Ball Mill  
Mine Ventilating Fans  
Cages and Skips  
Sheave Wheels  
Corliss Engines  
Coal Crushers  
Gray Iron Castings  
Open Hearth Steel Castings  
Gears, Moulded and Cut Teeth  
Special Machinery



**27° below!**  
what if it is?

This was the temperature the day this 13-ton worm-gear driven gasoline "loco" was put on this Quebec job. And the mercury, there, stays in the neighborhood of 27° below most of the winter. The E. B. Eddy Company write that the Vulcan has stood up well "against the bad weather conditions of snow and ice" that "it has been kept busy all the time and has been perfectly satisfactory."

That's the beauty of a Vulcan Gasoline Locomotive—it's made to withstand cold. Its electrical and mechanical parts are immune to below-zero conditions; and it's protected gear drive (there are NO chains to break or get out of order) runs smoothly at all times.

You can depend upon Vulcan Engineers to meet any haulage conditions—no matter how extreme the temperature or how severe the pull. It will pay to get latest Vulcan Gasoline Locomotive Bulletins.

## VULCAN IRON WORKS

Established 1849

WILKES-BARRE, PA.

New York  
50 Church St.

Chicago  
McCormick Bldg.

Pittsburgh, Wm. M. Bailey  
506 Bakewell Bldg.

**VULCAN** of  
**GASOLINE LOCOMOTIVES**  
WILKES-BARRE

# THE CRUSHERS

*with the*  
**Troubles Left Out**

## WHY THEY LEAD

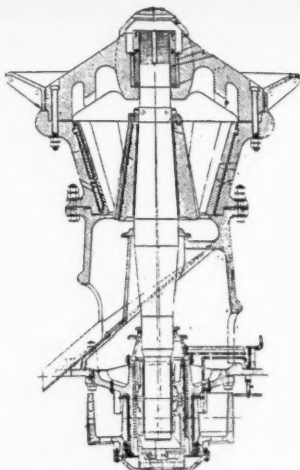
- 1—They are noiseless and run like watches.
- 2—50% greater capacity for same power.
- 3—Practically no wear on anything but head and concaves.
- 4—Short shaft and saving in head room with packed dust collars.
- 5—Shaft reinforced with self-locking head so that it cannot break where 90% of shafts have broken.
- 6—Can be driven right, left, or standard, as sent from shop.
- 7—Eccentric is turned by flexible coupling attached to pulley, which prevents side thrust and heating, as in geared crushers.
- 8—Ball and socket eccentric, self-aligning, eliminating friction and heating. Runs for years without attention.
- 9—Positive circulating oil system through filter and cut geared oil pump.
- 10—Made in our own shop by experts, trained for the job.
- 11—It is a crusher with the trouble left out. See it in operation, and you are unfit to listen to any geared crusher salesman. In fact, if you are near one of his machines, you can't hear him, if you are so inclined.
- 12—Our fine crusher does the work of 4 geared crushers.

*Send for catalogue and tell us what your problems are, and one of our experts will call on you without obligation on your part.*

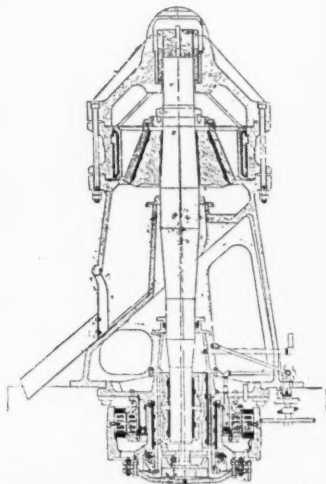
**KENNEDY VAN SAUN MFG. & ENGR. CORP.**  
50 Church St. NEW YORK

Kearns Bldg., Salt Lake City, Utah  
414 So. Spring St., Los Angeles, Calif.  
Annex Hotel, St. Louis, Mo.

1739 Roanoke Bldg., Chicago, Ill.  
73 Cullinan Bldg., Johannesburg, So. Africa  
40, Rue des Mathurins, Paris, France



Standard Ball Bearing Gearless Crusher.  
Sizes No. 1 to No. 60—Weights 1,000  
to 900,000 lbs.



Gearless Crusher for Fine Crushing.  
Do not be deceived by Vertical Con-  
caves; that is not what makes a fine  
crusher.



## Pull!

Sand to scrape out—gravel to dredge—great stones to lift—broken rocks to load—cars of limestone to drag uphill—the equipment varies, but the extraordinary pull power of Yellow Strand Wire Rope is equal to them all.

Powerful Yellow Strand, made of imported steel wire, will sustain the great stresses of pit and quarry until it has more than earned its cost in honest service.

Write for catalog—and name of nearest distributor of Yellow Strand and other dependable B & B Wire Ropes.

**BRODERICK & BASCOM ROPE CO.**

St. Louis, Mo.

Eastern Office and Warehouse: 76 Warren St., New York City  
Western Office: Seattle, Wash. Factories: St. Louis and Seattle

*Builders of B & B Aerial Tramways for Industrial haulage*

# Yellow Strand WIRE ROPE

JR439

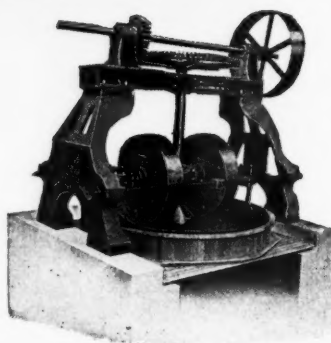
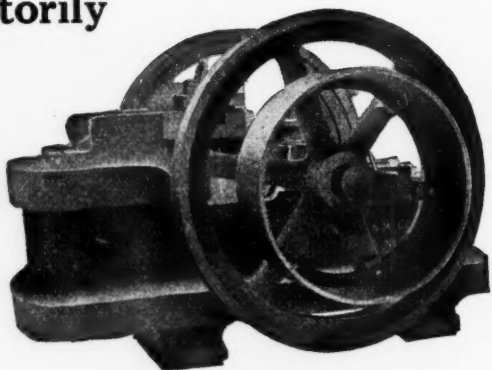
# LEWISTOWN FOUNDRY PRODUCTS

Will satisfactorily  
meet your

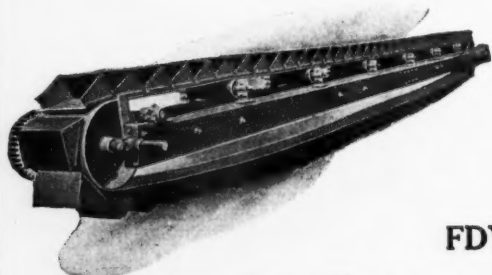
CRUSHING  
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needs

We manufacture a line of equipment for the above purposes in pit and quarry service and shall be pleased to furnish you with any desired information on whatever class of equipment you are interested in.



9-Foot Dry Pan



40-ft. Continuous Bucket Elevator

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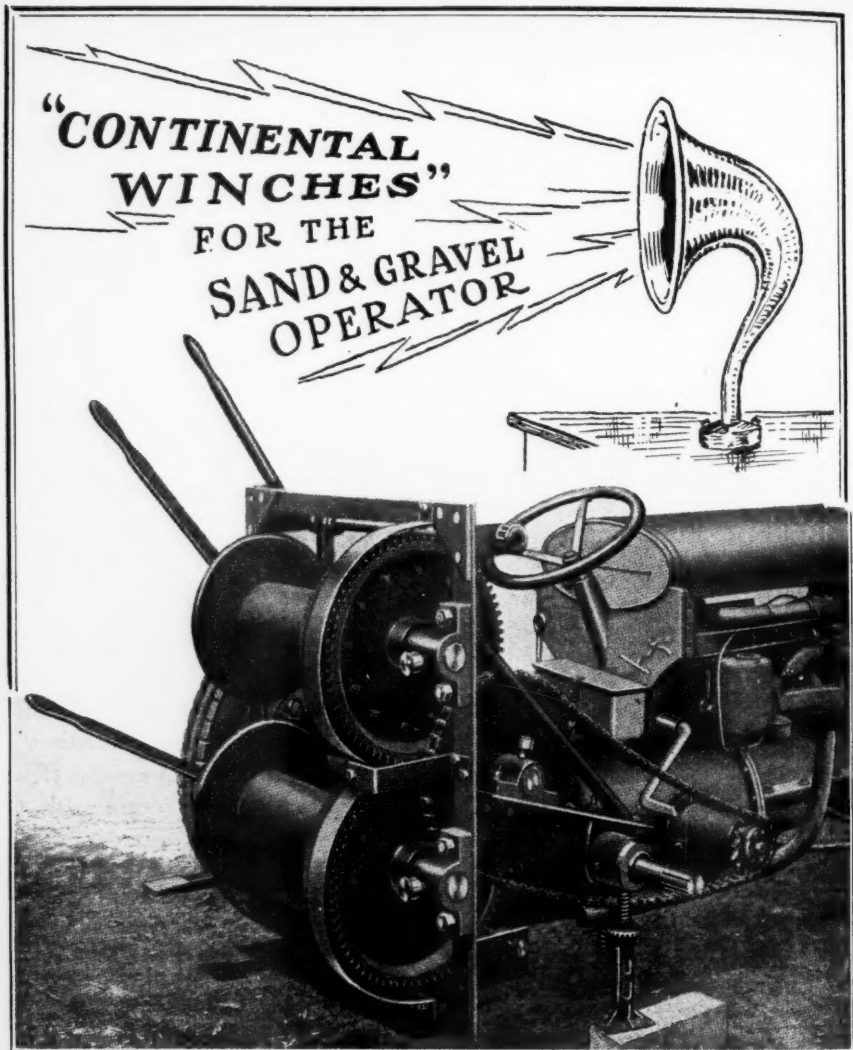
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# EXPLOSIVES



**T**HE operator in the sand and gravel field requires a powerful, uniform hoisting unit. The Continental Winch fulfills these requirements and more, they prove dependable under any ordinary conditions. Whether the need is for portable or stationary work, the Continental is constructed to meet it. Continental Winches are made in two types—friction and gear

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1444 Riverside Blvd.

P. O. Box 2673

MEMPHIS, TENN.



# Free Service to our readers

For the convenience of readers who are in the market for equipment, our "Free Service" department will furnish on request any information, catalogs and prices on any machinery, equipment or supplies used in pits and quarries. The coupon below makes it easy for you. Simply check, sign and mail.

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| <input type="checkbox"/> Bin Gates                               | <input type="checkbox"/> Conveyor Rollers                      | <input type="checkbox"/> Elevating Equipment                                      |
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| <input type="checkbox"/> Car Wheels                              |  |   |

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P. ....)</li> <li><input type="checkbox"/> Motors, Gasoline (H. P. ....)</li> <li><input type="checkbox"/> Motors, Gasoline Portable Power Unit (H. P. ....)</li> <li><input type="checkbox"/> Motor Truck Dump Bodies</li> <li><input type="checkbox"/> Motor Trucks</li> <li><input type="checkbox"/> Nozzles, Hydraulic Mining</li> <li><input type="checkbox"/> Nozzles, Suction Screen</li> <li><input type="checkbox"/> Oil Burners</li> <li><input type="checkbox"/> Oils and Lubricants</li> <li><input type="checkbox"/> Perforated Metal</li> <li><input type="checkbox"/> Picks and Shovels</li> <li><input type="checkbox"/> Pipe, Hydraulic</li> <li><input type="checkbox"/> Pipe, Iron</li> <li><input type="checkbox"/> Pipe, Spiral</li> <li><input type="checkbox"/> Plows</li> <li><input type="checkbox"/> Powder, Blasting</li> <li><input type="checkbox"/> Powder Magazines, Steel</li> <li><input type="checkbox"/> Power Transmitting Equipment</li> <li><input type="checkbox"/> Power Unit Gasoline, Portable (H. 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## How Sauerman Excavators Pay Their Way at Various Sand and Gravel Plants



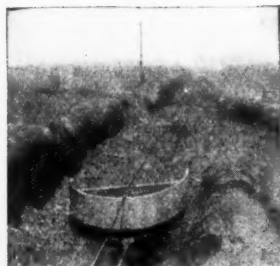
1-Yd. "Crescent" Moves 400 Yd. Hard-Packed Gravel a Day.



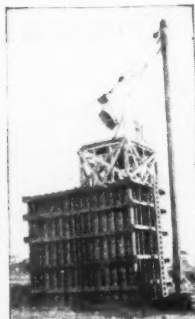
Sauerman Buckets Carry Heaping Loads



This Sauerman Bucket Lifts 5 Tons of Material Per Trip; Makes 60 Trips An Hour.



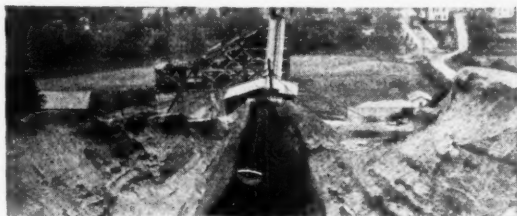
3/4-Yd. Crescent Power Scraper Stripping Overburden and Dumping Spoil Into Ravine.



"Junior" Cableway Produces 250 Yd. a Day at Low Cost.



Sauerman Slackline Working In Dry Deposit.



2,000 Yd. Per Day Is Capacity of This 4-Yd. "Crescent" When Operating On Short Haul.

The above illustrations give you some idea of how Sauerman Slackline Cableway Excavators and Power Drag Scrapers are being applied in solving the excavating and conveying problems of sand and gravel producers.

For complete information, write for Pamphlets No. 22 and 24.

**SAUERMAN BROS., INC., 434 S. CLINTON ST., CHICAGO**

## **WANTED!!**

**1000 QUARRYMEN FROM THE UNITED STATES AND  
CANADA**

## **WHAT FOR?**

**TO ATTEND THE ANNUAL CONVENTION OF THE  
NATIONAL CRUSHED STONE ASSOCIATION**

## **WHERE?**

**MOUNT ROYAL HOTEL—MONTREAL, CANADA**

## **WHEN**

**JANUARY 18, 19, 20, 21**

## **WHY**

To hear distinguished highway engineers, railroad executives and crushed stone producers give talks on subjects of vital interest to the entire industry.

To see the largest and most comprehensive Exhibit ever undertaken by the Manufacturers' Division will provide an unusual opportunity for quarrymen to view the very latest developments in quarry machinery and equipment.

To hear and discuss the policies of our new Bureau of Engineering.

To take part in the special Session being arranged for Superintendents.

**ALL QUARRYMEN OF THE UNITED STATES AND  
CANADA ARE INVITED TO ATTEND THIS CONVEN-  
TION WHETHER OR NOT MEMBERS OF THIS ASSO-  
CIATION.**

**Are You Coming?**

**January 19, 20, 21, 1926**

to

**The Tenth Annual Convention**

of the

**National Sand & Gravel Assn.**

at the

**Atlanta Biltmore Hotel**

**Atlanta, Georgia**

Every Sand & Gravel Producer is cordially  
invited and urged to attend

Get full information from

**T. R. BARROWS**

**Munsey Bldg.**

**Washington, D. C.**

## *Better than an Investment in Florida Land!*

*It Pays Profits Right from the Start*

### The Ottumwa Box Car Loader

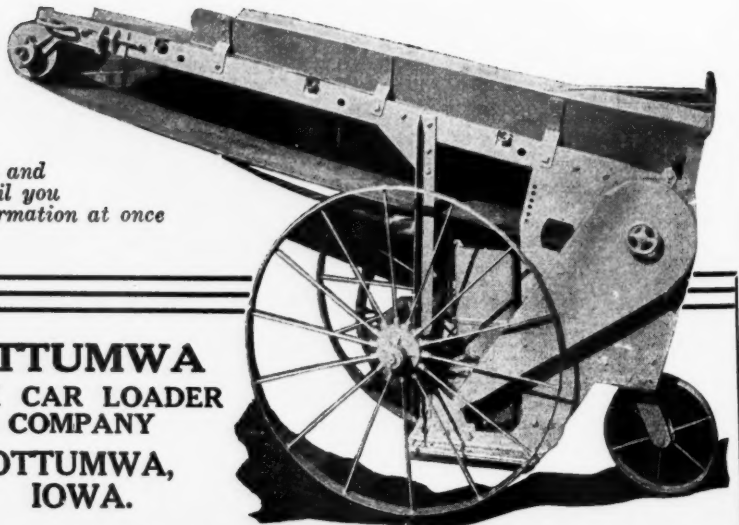
Why not collect regular dividends in savings by installing an Ottumwa Box Car Loader? Many plants have been able to make great savings in loading costs by using the Ottumwa.

The practical success of this machine in the fast loading of box cars makes it a necessary addition to the modern plant's equipment.

No more loafing gangs, no more tedious delays. With the Ottumwa on the job your costs will be reduced, and your capacity much increased.

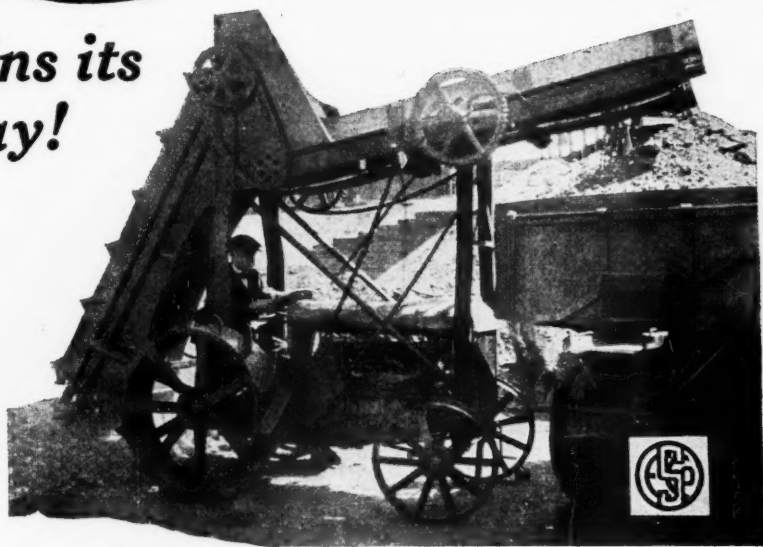
*Write us and  
we'll mail you  
full information at once*

**OTTUMWA  
BOX CAR LOADER  
COMPANY  
OTTUMWA,  
IOWA.**



# *Specialty* Fordson Loader

*Wins its  
Way!*



*You Want the Best Loader Made!*

The Specialty Fordson Loader is the answer to the demand for a portable loader moving and operating under its own power. There is no more compact loader made, for this outfit has much greater power than the conventional stationary outfit, and at but slight additional cost.

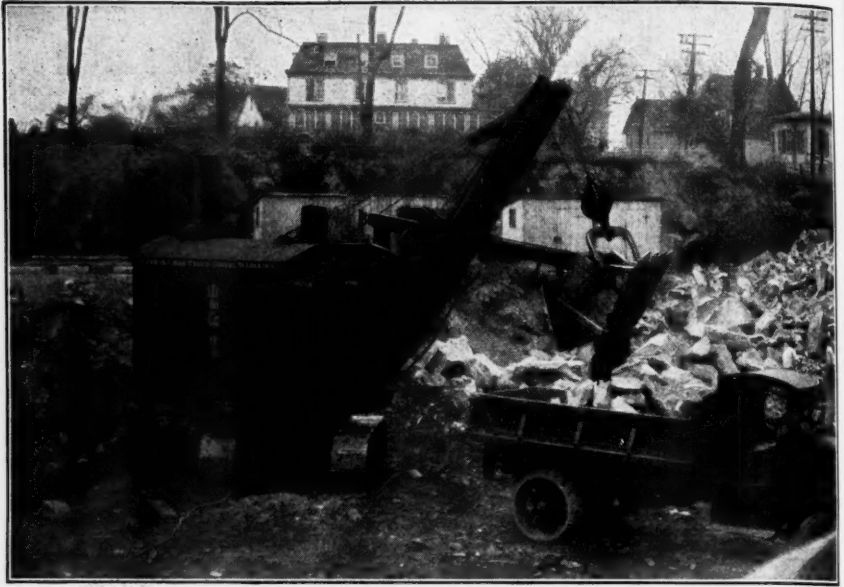
The Specialty Fordson Loader crowds while the buckets are in operation, independent of reverse gear, and it can be crowded much or little at a time. The crowding mechanism is self-contained with gears running in oil. The feeders clear a path sufficient for the tractor wheels. If you want simplicity of operation and dependability, install a Specialty.

*Write for full information, mailed on request.*

## Specialty Engineering Company

Allegheny & Trenton Aves.

Philadelphia, Pa.



## Good News for Shovel Users

**F**OR some time past, in fact ever since Thew  $\frac{1}{2}$  and  $\frac{3}{4}$ -yard shovels have been equipped with Center Drive Trucks, there has been a clamor from Thew one-yard shovel owners for Center Drives too.

Of course, it took time to make the change, but now it is done. Thew A1 one-yard shovels can now climb, steer and travel like Thew Type O Shovels.

"And that's going some," if you will take the word of every man who has bought a Thew Center Drive this year.

If you own a Thew A1, you don't have to buy a new shovel to get a Center Drive Truck. Yours can be equipped very easily. Ask us about it.

The above shovel belongs to I. F. Cavalluzzo, of New York. He ordered Thew Center Drives as soon as he got the good word.

If you are in the market for a new one-yard shovel, see a Center Drive perform before you buy. It will pay you.

THE THEW SHOVEL COMPANY, LORAIN, OHIO

# Thew Shovels

Dig Faster—Last Longer



# Pit and Quarry

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## No Greasing for 7 Months But No Sign of Wear

The worth and superiority of Brownhoist belt conveyors has been demonstrated time and again to skeptical industrial plants. One of the most interesting of these demonstrations has recently been completed in the foundry of a nationally known automobile maker.

A standard Brownhoist roller-bearing conveyor idler was installed in a conveyor at this plant. It was boxed and sealed so that it would receive no lubrication or attention and put to work with other idlers which were oiled twice a day.

After seven months of day and night service, this Brownhoist idler was dismantled and minutely inspected. "No wear whatsoever," was the inspectors' report. And the lubricant in the idler was almost as good as new.

Brownhoist roller-bearing idler design keeps dirt and grit out and grease in. Added to this they are locked into perfect, permanent alignment—two reasons why they last so long and give such dependable service. Catalog M-24 tells many more reasons. May we send you a copy?

**The Brown Hoisting Machinery Co., Cleveland, O.**

Branch Offices: New York, Chicago, Pittsburgh, New Orleans and San Francisco

# BROWNHOIST

MATERIAL HANDLING MACHINERY

# Pit and Quarry

*A Semi-Monthly Publication for Producers and Manufacturers of Sand, Gravel, Stone, Cement, Gypsum, Lime and Other Non-Metallic Minerals.*

Vol. 11

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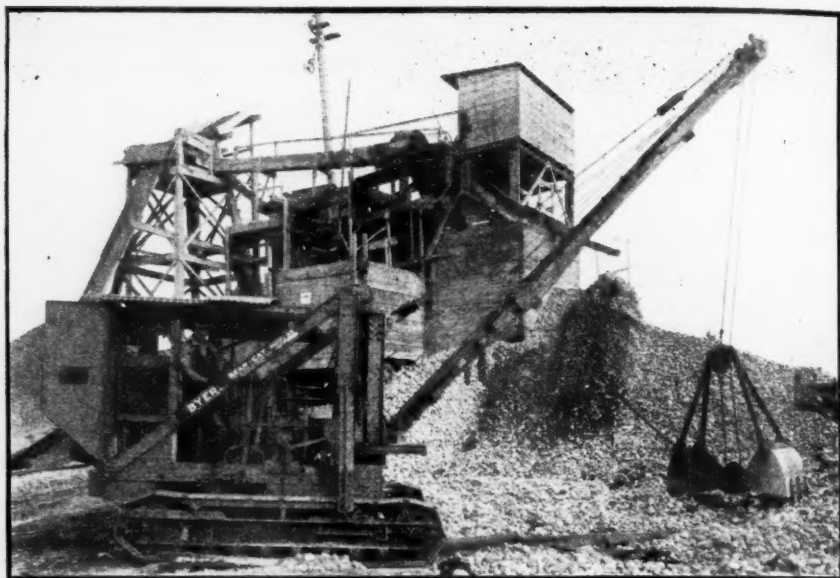
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## Speed in Reclaiming Tailings

**O**UT in Tacoma, Washington, the Bear Cat pictured above has the job of reclaiming tailings from a gravel plant. Only one man is required to operate, the bucket being tripped from the cab.

Speed is the outstanding feature of this half-yard clamshell outfit, excelling that of any other machine on the market. Not even the three-quarter yard machines can equal the Bear Cat's daily yardage.

The operating cost is exceptionally low, due to one man

operation, low fuel cost, and freedom from repairs.

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This machine handles a half-yard shovel as well as the clamshell, and is easily changed from one to the other. It is the ideal outfit for handling stone, gravel, sand or clay. Let us show you how it will make money for you.

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# Pit *and* Quarry

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## Looking Ahead

LOOKING ahead in the future of the non-metallic mineral industries is not only interesting but profitable to all engaged actively in the production of these commodities. However a forecast based solely upon statistics and charts without reference to the underlying trend might be quite impressive but probably of little use. In discussing the trends we may arrive at some really useful conclusions as to the future. For this reason you will find the many bristling comments, found throughout this number, of leaders interesting and helpful. These comments deal with specific conditions and trends as seen by an executive engaged actively in the production of that commodity of which he speaks.

Conditions in general seem good. Wages are high and advancing. Employment conditions are excellent and improving. The cost of living has increased but not as rapidly as wages. Agriculture has had a good year. These facts apply generally to every section of the country.

Industrial activity is better than normal and steadily improving. This is indicated largely by the fact that industrial output is good and increasing. Another favorable indication is the fact that corporation earnings, as they are published, indicate increases over the figures of last year. The opinions of many financial leaders indicate that it is quite possible profits for 1925, for business in general, will be larger than those of any previous peace time year. The figures for commercial failures show decreasing numbers of insolvencies and reduced liabilities. Success in business now seems more general than it has been at any time since the past war inflation period. The records of trade, commerce and transportation are very favorable. The railroads are carrying the heaviest traffic in their history. The volumes and values of goods being sold by retail and wholesale concerns, especially by chain stores and

mail order houses, are of record breaking proportions.

The present period of prosperity in the non-metallic mineral industries has of course been based largely upon the enormous building program which has been of huge proportions for the last four years. Building construction at the present time is going forward. Real estate booms are under way in so many cities and sections of the country that they are almost general. One authoritative source of information claims that building in the United States for this year will total \$6,500,000,000 creating a new record and a billion and a half over the total for last year. The figures are based on aggregate reports from several hundred cities and towns and by estimating for the month of December.

There are some interesting and opposite views on the future of building construction. Two of the best known authorities differ. Thomas S. Holden, statistician for the F. W. Dodge Corporation, expresses the opinion that a real reaction in building is immediately ahead while W. C. Clark, economist for S. W. Straus and Company, declares that actual construction operations will continue on a high level for another six months and probably through practically all next year. In summing up his conclusions, Mr. Holden says:

"Since the depression of 1920 and 1921, there were minor reactions in building activity, both in the middle of 1923 and the middle of 1924. They lasted for several months and the principal effect both times was to give the industry a breathing space before starting up again at a faster pace than before. The stimulus of a building shortage has been removed, but it is entirely possible that the growth requirements of the country may become larger than we now conceive. If the October reaction was a real reaction and not a merely accidental decline, it will not necessarily be a long or severe one. It may be, of course,

that our cycle periods have undergone a fundamental change, as some people believe.

"The situation seems to be unusually difficult to analyze. On the whole, it looks as if there is a real reaction on the way, a flattening out of the boom. It seems likely to develop fairly gradually, but unlikely to drop to extreme levels.

"It appears to me that the building total of 1926 will be less than that of this year, but probably not a great deal less. Assuming the 1924 volume for the entire country to have been about \$3,250,000,000 and the 1925 total volume to be around \$6,500,000,000, a fair estimate for 1926 in the light of present conditions and subject to change as new factors develop, would be somewhere between these two figures, say about \$5,750,000,000."

In summing up Mr. Clark's conclusions he says:

"I believe that building activity, that is to say, actual construction operations, will continue on a high level certainly for another six months and probably through practically all of next year. If we are able to avoid a serious credit stringency, building activity, by a process of shifting from one district to another and from one type of structure to another, by a reliance chiefly upon the tremendous volume of demand for normal replacements and the normal increase in population and prosperity, and by a more or less deliberate control of some of the excesses which are now apparent in certain quarters, will show a gradual tapering off instead of a drastic collapse, and should remain adequate in volume to avoid being the cause of a general business depression. In part this is made possible by the fact that most other conditions are favorable to a continuance of general prosperity.

"Not only does the heavy volume of permits issued, contracts awarded and projects contemplated assure a high volume of actual construction for six to eight months or more, but it also seems to bear eloquent testimony to the continuing strength of the demand for new construction.

"On the other hand, it calls for a note of caution. For there are a number of signs that in some sections, part of this recent tremendous increase in building activity is speculative building based on the stimulus of easy money. There is, in my opinion, too much vitality in the

movement to explain it wholly or perhaps even largely on this ground, but certainly the easy money stimulus and the rapid multiplication of lending agencies have played an important part in certain areas. To the extent that this factor is effective, current building activity is subject to the danger of reaction caused by rising money rates."

Highway construction, which is another important factor in the prosperity of the non-metallic mineral industries, at the present time does not show any tendencies which will adversely affect the producers of raw materials during the coming year. In fact, the present indications show strongly that the road building program of the highway construction will be on the largest scale next year. The growing volume of automobile traffic is an important element in keeping public opinion in favor of highway construction. From practically every leading state we have opinions which indicate that they will continue at the same rate, if they do not increase their highway programs. It is interesting to note here that considerable business will come next year as a result of the demand for wider highways. With so many highway projects incompleting, we can see no reason for a check in the present program.

In looking ahead we see a dangerous tendency to over-production. The statistics that are available indicate clearly that the plant capacities and new plants are being built to produce capacities at a combined increasing rate somewhat in excess of the increasing demand. This condition will eventually and probably during 1926 have a material effect upon prices. It is imperative that manufacturers study conditions in their plants with a view to reducing production costs as much as possible. Competition next year will largely concern costs of production.

Some time in the future building must slow down. When that happens real estate booms will also slow down. Some time in the future stock prices will stop advancing and begin to decline. Some time in the future our present high level of purchasing power will be checked. Some time in the future our present highway programs will materially change. Something might happen in 1926 to check the prosperity of the non-metallic mineral industries but we doubt it.

# Progress in the Cement Industry

By C. H. Sonntag

**M**ANY minds, each viewing progress through a different pair of spectacles, have contributed to the growth of the cement industry. The views expressed here must not be taken as an all embracing survey of the field. They are not intended as such but rather as a report made from one viewpoint. It is readily admitted that some essentials, particularly in the selling and administrative departments, will not be accorded their true value.

Cement making, considered as a business proposition, has long since passed the teething stage, has put behind it most of its growing pains, and is entering more and more into the last stage of business organization—that of the acquisition of smaller companies by larger ones. The inevitable result of this trend will bring the industry into the hands of a few strongly financed groups, under whose wings some scattered independent producers will hover more or less, without actually losing their identity. Out of this will come greater market stability, less “dumping” during times of economic depression, the elimination of certain trade abuses, and possibly more uniform manufacturing methods.

We may note that the International Cement Corporation, already owning a number of domestic and foreign mills, has acquired the Indiana Portland Cement Company, with works at Lime-dale, Indiana, and the Birmingham plant of the Phoenix Portland Cement Company, together with the activities of the latter towards the erection of a new mill near New Orleans. The Lehigh Portland Cement Company, also the owner of a large number of mills, has taken over the Bath Company, with an old established plant at Bath, Pennsylvania, and a partly finished one at Sandt's Eddy, in the same state. The Signal Mountain Portland Cement Company has purchased the Gulf States mill at Spocari, Alabama, and is understood to contemplate extensive improvements and enlargements.

Further indication of the tendency to consolidation is seen in the reported formation of a new corporation to control the Helderberg and the Security Cement and Lime Companies and perhaps others.

Among the new mills which either have started operation during the past year or will open shortly are the Clinchfield Portland Cement Corporation, Coreen, Georgia; Southwestern Portland Cement Company, Dayton, Ohio; Standard Portland Cement Company, Painesville, Ohio; Wabash Portland Cement Company, Osborn, Ohio; Peerless Portland Cement Company, Detroit, Michigan; The Virginia Portland Cement Company, South Norfolk, Virginia. It will be noted that three of these are branches of companies which have been making cement for years, and that another group of three is being established in Ohio, a state that might have been considered to have been already well supplied with cement.

As an instance of the readiness of the cement makers to go after business, we have the reported project of interests connected with the Signal Mountain Company to construct a plant in Florida. If the boom in that section continues, they will be in better position than plants now shipping into Florida who find embargoes on construction material because of the congested condition of the railroads. There have been a number of incorporations of new cement companies this year, but most of them seem destined never to get to the production stage.

## Water Transportation

Freight embargoes call to mind the extensive and apparently successful attempt now being made by the federal government to revive transportation on the southern and mid-continent rivers. The barge and tow-boat equipment in use is far superior to the old-time river steamer, and already quite a little cement has been carried down the Mississippi in this way. The method has its limitations, as some customers want their cement delivered alongside their warehouses, but it is believed that the high-class facilities and regular and frequent schedules offered will bring about a gradual increase in water shipments by mills in position to take advantage of it.

## Mills Near Cities

Cities are large consumers of cement, and a mill in or near a city has a great advantage over more dis-

tant competitors in that particular market. The old feeling that a cement mill is too dusty and dirty to operate in a closely settled section is giving way, and both St. Louis and Detroit now have mills close enough to show that they can be run without becoming dust nuisances. In each case the wet process has been used, since it eliminates all dust in the raw grinding department and much of that from the kiln stacks. These mills deliver to much of their city trade by truck, and will have only short hauls, either by truck or rail, to the prosperous suburbs.

#### **New Cements**

Many chemists and engineers have given thought to the high alumina cement developed and produced as a regular article of trade in France, but so far only one American cement manufacturer has undertaken to make and market such a product. Deposits of suitable sources of alumina seem to be limited to the southern states, and consumers will probably have to be educated to the new cement, but the beginning has been made.

Possibly due to the stimulus of the high alumina cement, there seems to be a tendency among the makers of standard Portland to study their product more carefully to see if some measure of the high early strength attained by the new cement can not be given to the older one. Finer grinding is one result of this. Careful control of the ratio of alumina to silica, where the available raw materials permit this, is being practiced by some, and it may be that out of this study there will come a vastly improved Portland cement that can be made from materials more universally found than ores of aluminum.

#### **Research Work**

The manufacturers have come to realize that problems in the economics of large-scale production of cement are just as much subjects for scientific research as the fundamentals underlying the electrical industry, for example. Research implies a laboratory, and for the solution of certain problems the laboratory must be of plant size. Realizing that a mill in commercial operation is hardly a place to carry on investigative work, especially if it interferes with production, the Portland Cement Association has decided to build an experimental cement mill, where basic questions of grinding, kiln practice and similar problems may be worked out through

full-scale research. The results will be beneficial to the industry.

Fully realizing that chemical control of cement manufacture, while highly developed, is still on a practically empirical basis, the Association is investigating the constitution of cement, using the most refined methods of physico-chemical research, and including a thorough knowledge of colloids, to which class of substances many believe cement to belong. It is hoped that out of this will come information which will simplify and cheapen the manufacturing process. If the nature of the compounds existing in cement is definitely determined, as well as the way in which they are combined in the complex that we call clinker, and if we learn what really happens when cement sets, we shall have solved questions that have occupied the minds and taxed the knowledge of scientific men, both in Europe and in this country, for the past twenty-five years. Basic research, such as this promises to be, must be the real foundation of every large technical development.

#### **New Equipment**

Two pieces of apparatus have come more to the front during the past twelve months, though neither of them was a new introduction in that period. The speed reducer is more and more replacing older style drives as it proves itself quite capable of doing the work for which it was designed, and no new equipment is now installed without giving reducers serious thought. The Fuller-Kinyon pump, originally and for some time used for powdered coal only, has now thoroughly demonstrated its ability to handle raw mix and finished cement, and is definitely offered for these purposes on the basis of engineering and operating experience already acquired.

#### **Waste Heat Boilers**

The raising of steam for power generation by the heat of the kiln stack gas is now a part of the operation of about forty-five mills, but this practice, which was at one time expected to become a part of nearly every cement plant's procedure, seems to have reached a hurdle that it is having some difficulty in getting over. This is not due to any basic technical defect of the waste heat recovery idea, for so far as the writer knows all these installations are doing the work that was expected of them when they were put in.



There are several reasons why waste heat boilers are not being rapidly introduced at this time, some of which follow:—

a—A few plants have small kilns and other antiquated equipment for burning, and their owners evidently feel that these departments should first be modernized, so that if waste heat boilers are later installed, the whole layout will represent up-to-date practice.

b—Some wet process mills apparently feel that the stack gases from their kilns are at such a low temperature that they would not generate enough steam to warrant the cost of the necessary equipment to recover them; in other words, the boilers would be working at too low a percentage of their normal rating. Perhaps this is so with present kiln practice, but there are serious reasons to doubt the basic soundness of the above conclusion. A careful engineering analysis of the situation will in all probability put things in a different light. Even now some wet process mills are getting by far the larger part of their steam from waste heat.

c—The most potent influence in preventing the installation of more waste heat boilers is the price at which public utility companies are willing to sell power to cement plants. A cement mill is an ideal customer from the central station standpoint. The load is large and very steady throughout the entire twenty-four hours, with the exception of the quarry and crushers. Since synchronous motors have come into use for driving tube mills, compeb mills and air compressors, the power factor can be kept close to unity. As a result central station power is being sold to cement plants at a price which causes one to question whether it represents the real cost to the producer plus a reasonable profit. Some mill owners who have been buying energy for several years, have never had a good steam plant in the modern sense, and if they were to adopt waste heat recovery now they would have to buy not only boilers, but a complete steam turbo-generator outfit as well, which means the investment of a great deal of money.

#### The New Package

One may feel perfectly safe in saying that the returnable cloth bag has been the cause of more bitterness and

dissension between cement makers and their customers than all other causes put together. The returnable package became established in the early days of the industry, and its use has continued as long as the customer had to pay the price of the wooden barrel in order to get a non-returnable package that would give more protection than the common single-ply paper bag; but there has always been the wish that a sale of cement might be a complete transaction, uncomplicated by the return of a more or less damaged container for credit. This wish bids fair to be answered by the new multiple-ply paper bag that has come into extensive use during the year just passed.

The bag consists of several independent layers of paper, usually four or five. Each ply is really a bag in itself except at the ends, and the walls are hence more flexible or pliable than they would be if the paper were all in one layer. In fact, if the latter construction were possible, the bag would be as stiff as light pasteboard, and of no value as a container for cement. The ends are sewed with a binding of tough paper. While the bag, as it is, is practically waterproof, it should be possible to make one or more plies of asphalt-treated paper, which would effectually prevent the entrance of water. One corner is formed into an ingenious valve on the Bates principle, and the bag is intended to be filled on the Bates packer, whose use in the cement industry is now almost universal.

If the multi-wall paper bag should entirely supersede the returnable cloth package, there would be a noticeable saving in packing costs, for there would be no investment in equipment or labor for sorting, cleaning, repairing and storing cloth bags, nor would it be necessary to tie up large sums in reserve stocks of bags which would be idle during the winter. But of as much ultimate value as these would be the avoidance of friction with the customer over the returnable package.

There have been developments in the cement business, particularly in markets and marketing, that have not been touched upon in the foregoing resumé, but as to the subjects discussed, an attempt has been made to give some idea of the progress and tendencies of the industry in 1925.

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## 1926 in the Motor Truck Industry

By O. W. Hayes, President, Republic Motor Truck Co., Inc.

So far as the motor truck industries is concerned I cannot look upon 1926 with anything other than the greatest optimism. On every hand the signs for one of our most prosperous years are not lacking. The motor truck industry is so closely knitted into the fabric of our industrial and commercial life that whatever affects the latter is bound to have a similar reaction on the former. The motor truck is a big part of the actual production forces of the nation. Therefore when our national industries prosper, the motor truck has work to do and the truck market booms. When conditions are not good, the demand for trucks lags and the market consequently falls off.

We all know this, but it is well to repeat it so as to gain an accurate picture of the relation of national and international conditions to the motor truck market. My reasons for predicting a prosperous year for the motor truck industry are many. In the first place, the truck industry is on a solid foundation. By that I mean it has not over-expanded its producing capacity, nor has it a big surplus of new trucks on hand to be disposed of. Neither has it, generally speaking, a surplus inventory—a situation which has proved disastrous in some instances in the past.

For the past few years, the motor truck manufacturers have been going along on a sound, sensible basis, building only what the demand called for and not attempting to load the dealers with trucks they could not sell. The result is that the truck industry is entering the year 1926 with a clean slate, and all new business will mean the building of just that many trucks.

To ascertain the truck demand, requires an analysis of general conditions. Stocks have shown a decided upward trend, and while that is not a safe gauge, yet it is an indication. Tax reductions, too, mean a more ambitious industrial program in 1926, because capital will not be so severely penalized as in the past few years. Industrial activity again means a greater call for trucks.

The attitude of the railroads toward the motor truck is another cause for rejoicing, because it means the opening up of another great market for truck sales. The railroads through

careful study and research as well as by actual experiments have found that the motor truck is the solution to the threatened congestion at the big freight terminals. Already some of the large companies are employing trucks, and there is no question but what this use of trucks will be greatly expanded in 1926. It is true that in most cases the railroads do not purchase the trucks outright, employing contracting companies instead. However, the contractors will need to augment their present fleets.

Then there is the motor bus—one of the greatest single truck markets opened. At the present time there are about 65,000 buses in operation. It is predicted that this number will be increased to 300,000 by 1930. As a result of the development of the motor bus, the large centralized schools in rural districts have replaced the "little red school house," and the children of farmers are enjoying educational advantages equal to those of larger cities.

One of the strongest assurances of the future of the truck industry is the tremendous good roads program which is under way in every state in the Union, as well as in a majority of foreign countries. A notable example of the good roads movement abroad is Cuba, where the people have voted a huge bond issue to cover the island with a net-work of improved highways. Every additional mile of good roads enlarges the market for trucks and busses. When it is considered that many millions of dollars are being spent annually by national, state and county governments on road building programs, the significance of this statement becomes clear.

Every industrial and commercial institution is rapidly motorizing its transportation system—express companies, ice companies, milk companies, department stores, factories, newspapers—all of them have turned to the motor truck, not only for more economical transportation of their products, but for greater speed and efficiency.

In the farm field the truck outlook is brighter than it has been since the "boom" days following the war. Bumper crops and good profits in the fall of 1925 have helped the farmers immensely.

## What's Ahead in the Cement Industry

**William M. Kinney says:**

"Nineteen Hundred and Twenty-five has been a year of ample supply of cement, despite a demand that will exceed that of last year. Throughout the year stocks have been considerably larger than in 1924, according to the monthly reports of the U. S. Bureau of Mines. Although building permits have been running unexpectedly high this fall and may forecast another year of high activity, there will be plenty of cement to take care of all needs.

"In fact, the cement manufacturing capacity in the United States is well beyond the requirements of the country for several years to come. The annual producing capacity of the cement industry in this country is conservatively estimated to be about 185,000,000 barrels, and a number of plants now under construction will soon increase this total by many millions of barrels. Cement producers are therefore well prepared for whatever demands the construction field may make during the approaching new year.

"The great volume of late summer and fall building permits is of especial interest as a strong indicator of heightened activity in winter construction. As soon as the American public can shake off the habit of so largely discontinuing building work during the cold months, and will utilize labor and contractors' organizations the year through, it will have taken a great step toward the most efficient and economical use of construction facilities.

"Nineteen twenty-six will doubtless see a continued increase in concrete road and street paving. City pavements have been making rapid gains, as the merits of concrete become more widely understood. In highway construction, the year has been notable for the completion of the first super-highway leading from Detroit. On Woodward avenue, two 44-foot concrete pavements have been built, and will be put clear through to Pontiac, Michigan, as rapidly as possible. This marks the beginning of a new era in road planning and construction.

"Next year should bring an increased demand for concrete building units, such as block, tile and brick. The concrete masonry house is rising rapidly in general favor as its ad-

vantages become better known. The varied pleasing effects now obtainable with stucco are an important factor in this growing popularity.

"In the cement industry itself, the success of the first 'no-accident month' campaign, in which practically the entire industry in the United States and Canada participated, is worthy of note. During June, the month selected, lost time from accidents was cut 65 per cent from the June, 1924 figures. A similar campaign is planned for 1926, and a consistent improvement over the industry's already good record is hoped for throughout the year."

William M. Kinney,  
Gen. Mgr., Portland Cement Assn.

**F. W. Kelly says:**

"Portland cement concrete has so completely demonstrated itself to be the most economical material for securing quick, safe and permanent results in almost all forms of building construction, that the use of Portland cement may be expected to increase with the increasing development of our country which is generally forecast as continuing in 1926.

"The records which have been made in 1925 in general building construction and in roads and pavements have been at least partly due to the increasing convenience and certainty with which concrete can be made, because of the improved machinery now available, and the improved methods which are based upon exhaustive scientific research work in the use of cement.

"Probably no other industry has witnessed a greater increase in knowledge, and greater refinements in practice. This must make for improved quality in concrete, additional satisfaction, and increased use. Fire safety is best secured by the use of Portland cement concrete in homes, schools, hotels, hospitals, business buildings and factories. Concrete building block and other concrete unit products make the material economically available for the small as well as large consumer.

"Modern vehicles require a hard permanent road surface. This must be secured at the lowest cost. Concrete has demonstrated in city pavements the same values which have long

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been evident in country highways. The cleanliness and convenience of the concrete paved alley-way has superseded the intolerable conditions of the old city alley.

"Railroads which at terminals and along the right of way, have for years used concrete in buildings, bridges, tunnels, retaining walls, platforms, are now finding concrete useful for paving approaches to freight stations, and in one form or another for track support.

"Dams of concrete for water storage are being constructed in increasing numbers to meet the larger demands of our growing urban population, for more water and more power. Aqueducts and pole lines to supplement them are being built of concrete. Our rural communities and our farms are finding in suitable concrete structures, an investment paying large returns. Concrete is entering more fully each year into every department of life.

"In the United States there is today an ample margin of cement producing capacity above demand, and there is a wide distribution of plants producing Portland cement, so that the consumer can make his plans for using cement with the assurance that he can get it when and where needed, at a reasonable price.

"The year 1926 opens with a better balance in values between the different branches of industrial effort than has existed at any time since the war. At home and abroad there seems to be a greater desire and determination to work for the accomplishment of results, rather than endeavor to obtain them, unearned, through political or coercive methods.

"If this same spirit prevails throughout the year, it should be one of prosperity in this country, and the cement industry should expect a good volume of business upon which it is properly entitled to a fair profit."

F. W. Kelly,  
Pres., North American Cement Corp.

**B. F. Affleck says;**

"Next to agriculture, construction is the country's largest industry. It is interwoven with agriculture, transportation, commerce and general business; and in these fields the outlook is promising. Business generally is good. Railroads are efficiently operated and have met heavy demands without a transportation congestion. The financial recovery of the farmer is an accomplished fact. So, if gen-

eral business conditions continue as promising in 1926, construction, and along with it the cement industry, may look forward with encouragement.

"It is believed by some that the shortage in residential construction caused by the war has about been made up so that work of this kind will perhaps be more nearly normal in 1926. But in commercial and industrial construction and in public works and utilities the tendency is for an increased volume. This presents a favorable outlook for the cement industry because in these classes of work the amount of cement per dollar of contract is larger than in residential construction.

"There is an increasing appreciation of the value of concrete products for commercial and industrial work and also for pipe of larger sizes used for municipal work. In addition, the increasing demand for better construction of homes should result in an increase of concrete construction and wider use of concrete products.

"From present indications, the road building programs for 1926 will at least equal those in 1925. The leading states presumably will continue at about the same rate, and it is anticipated that a number of additional states will start with small programs in 1926. The need for this is best indicated by the growing volume of automobile traffic. There are about 19,000,000 automobiles in the world, 17,000,000 of which are owned in the United States. While road and street building programs have been large, they have not been sufficient to much more than provide parking space for the increased number of automobiles each year, to say nothing of providing space enough to run these millions of cars. Wayne County (Detroit), Michigan, which so often in the past has shown the lead is again in the forefront with its determination to plan all of its roads on the basis of an ultimate minimum width of 40 feet. Having already as complete a network of concrete highways as perhaps any county in the country, the need in Wayne County is not so much for additional mileage as it is for wider pavements on present roads. This has led the County Road Commissioners to exert their major effort and expend the largest part of their funds on widening projects. 'Our concrete roads,' says the current an-

nual Wayne County report, 'some of which have been in use for 16 years, lend themselves admirably to the widening program without any sacrifice of initial investment. For the next five years the work of bringing the widths of pavement up to a minimum of 40 feet will be the principal endeavor.' The public elsewhere is demanding wider roads, as highways now are so congested that many autoists refrain from going out, particularly on week-ends, not because of any lack of desire but because of the dangers and handicaps due to congestion.

And now, what of the country's cement producing capacity? According to the U. S. Department of Commerce, shipments for the first ten months in 1925 have been about 140 million barrels and indicate for the entire year of 1925 about 156 million barrels, or 7 per cent more than in 1924. Producing capacity, however, has increased to the extent that a number of companies have not been able to market the entire output of their plants and have been forced to reduce production accordingly. Even so, stocks on hand are greater than they ever have been at this time of the year. Capacity is increasing faster than use. This year much more cement could have been supplied than the country required, and the indications are that capacity next year will be further increased to a total of about 195 million barrels, or over 20 per cent more than the most that has ever been used in any single year, including 1925. In Ohio and Michigan, for example, the increase in capacity in 4 years has been 118 per cent as against an increase in use of only 38 per cent.

"From these figures it would seem that even though use of cement in 1926 may increase due to larger road building programs, increased construction in commercial and industrial fields and larger building programs by municipalities and public utilities, yet the cement producing capacity of the country will be more than ample. This deserves particularly earnest consideration because concrete construction is permanent. The 156 million barrels of cement used in 1925 and the millions of barrels of cement used in previous years will remain in use for many years more. Construction in 1926 will not be to replace the concrete construction of previous years, but rather to satisfy additional de-

mands. While food, clothing, shoes and most other things are consumed in use, concrete is permanent. It does not wear out. Practically all the cement that has been shipped still serves a useful purpose. It has not been consumed but has been transformed into houses, industrial buildings, improved highways, water power developments and other valuable improvements that form permanent additions to the taxable wealth of the country as well as tools for production of additional wealth. In other words, the use of cement in any year is measured not by the shipments of that year but rather by the accumulated shipments to date. It is in this light that a 1926 producing capacity more than 20 per cent in excess of the most that has been used in any year must be viewed."

B. F. Affleck,

Pres., Universal Portland Cement Co.

Robert S. Schultz, Jr., says:

"The year 1926 promises to be another record breaking year in the Cement Industry but I anticipate that the rate of increase in consumption will be less than for 1925. On the other hand it seems probable that the shipments for the country as a whole will be better balanced than in 1925 and that those districts which supply a large agricultural demand will show a large increase in that demand.

"It seems probable that the large increase in production capacity in several districts will result in increased competition in those and neighboring districts, and possibly throughout the whole country. This should result in a healthy improvement in quality of product rather than in serious price cutting.

"There is a very evident tendency toward improved quality of product within the industry itself. This is resulting in improved manufacturing methods and is requiring economies in manufacture to permit increase in quality without corresponding increase in cost.

"There is also an evident demand among consumers for improved quality of cement. This is probably due largely to the increased application of concrete to structures requiring thin sections. But the actual improvement in quality is benefitting all consumers alike.

"An early increase in the standard specifications for cement can be anticipated, as well as the inclusion of

the compressive test in the specifications.

"Within the industry the increased use of large capacity units can be expected. As a whole, the industry is 'casting its eyes inward' in an effort to find the answer to the problem of improving quality without increasing the cost to the consumer. The most generally applied answer in the use of large capacity units. Additional economies can be anticipated in power and in fuel consumptions.

"In general, the cement industry is in an extremely healthy condition and there appear no present reasons why 1926 should materially alter that condition."

Robert S. Schultz, Jr.,  
Consulting Engineer.

**Frank G. Conkling says:**

"The entire production of portland cement throughout the United States, for the year 1925, will show a substantial increase over the year 1924. Of this increase a very large per cent is represented by the increase in the South.

"Our opinion is that 1926 will see an increased demand for cement and that in all branches of the construction industry, business will be very good and shipments of cement, particularly from the southern mills, correspondingly large."

Frank G. Conkling,  
Asst. to President, Natl. Cement Co.

**James W. Alker says:**

"It is my opinion that next year will bring forward more business than the year 1925. While I do not believe there will be so much private work undertaken, there is a great deal of public work to be done, such as subways, roads, tunnels, etc., which I believe will more than consume the amount of cement which can be manufactured this coming year."

James W. Alker,  
Vice Pres., Pennsylvania Cement Co.

**C. B. Condon says:**

"This company's territory of distribution comprises Iowa, southern Minnesota, South Dakota and Nebraska. The outlook for 1926 is not particularly encouraging. The road building program will not be far enough along to take much cement. General conditions throughout our territory are not favorable, in spite of a very large corn crop. In Iowa we have had in the last eighteen months a failure of

a bank and a half to the county, which shows how bad conditions are. During the current year, cement consumption in Iowa decreased fifteen per cent, as compared to 1924. It may be that when this large corn crop is turned into money either by cash sales or by feeding through hogs, there will be some improvement in the general situation among the farmers, but we do not look for any decided change in the purchasing power of the farmer to take place in 1926."

C. B. Condon,  
Gen. Mgr., Hawkeye  
Portland Cement Company.

**F. R. Kanengeiser says:**

"Our opinion of the outlook of the cement industry for 1926 can be briefly stated. There will be a good year and a satisfactory demand. Certain territories, however, are likely to feel the pinch of competition, for without question the cement industry is now overbuilt. I do not believe that the manufacturing capacity of the country will be used up."

F. R. Kanengeiser,  
First Vice Pres. and Gen. Mgr., The  
Bessemer Limestone and Cement Co.

**W. W. Fischer says:**

"This, I believe, will prove one of the best years the industry has ever had. There is an abundance of road work everywhere. Construction work of all kinds promises to be good. The railroads should be heavy purchasers of ballast. The upturn in the demand for iron and steel should result in a larger demand for fluxing stone. To me, the outlook is very good indeed."

W. W. Fischer,  
Fischer Lime and Cement Company.

**W. B. Newberry says:**

"There is now every prospect for a very good year. Much of the highway construction laid out for 1925 has been postponed and can hardly longer be delayed. Road building everywhere is crying for completion, and every year the public is realizing by force of many examples, the value of cement pavement for both town and country highways. This is today the largest outlet for cement affording reason for an expectation of material increase in the future.

"The only cloud on our commercial horizon is that of over-production, and it may well be that 1926 will see much greater competition among cement manufacturers in the same fields than

in previous years. Many new plants have been constructed and older ones enlarged, and there will surely be no dearth of cement on the market in 1926. Those mills, however, which have the most modern and economical equipment and can manufacture cement at a low cost, will continue to manufacture successfully and still earn a satisfactory profit for their stockholders, although there may be some casualties among the older and less well equipped plants."

W. B. Newberry,  
Asst. Mgr., Sandusky Cement Co.

**J. F. Schroeder says:**

"Building construction in Southeastern Iowa does not appear to show any increase for 1926 over the year of 1925; I believe, however, that the municipal and state paving will show a considerable increase for 1926, and also that paving operations will get underway earlier next spring than usual. This increase we estimate to be from 25 to 30 per cent, and believe that conditions as a whole will be more prosperous for the year of 1926 than they were for 1925.

"Prices for the year 1925 were the lowest that we have ever experienced, being about 20 per cent lower than in 1924. It is our feeling, however, that this decrease will be again overcome in 1926 on account of the outlook for increased business. Contractors are gradually showing a tendency to cooperate to a fuller extent with the producers by placing orders for material in storage pile as much as possible.

"The inspection of materials has become more stringent, as the majority of the city and commercial engineers and architects are adopting the highway specifications and their method of inspection of material, also the placing of the concrete. We, however, have become accustomed to the inspection which prevails at this time, and while we sometimes have a small percentage of additional waste at the plant, we have accordingly far less trouble at destination on account of the materials' having been properly prepared and inspected before shipment is made, which is a real satisfaction."

J. F. Schroeder  
Sec. and Treas., Linwood Cement Co.

**A. T. McCormack says:**

"We are quite optimistic with reference to the cement conditions that will

prevail during the year 1926. While it is true that production has increased in the industry, we believe, on the other hand, that the private buildings and the demand for public improvements, particularly in the manner of improved highways and large sewer projects will be great enough to absorb the production of 1926. The agricultural communities are looked upon to consume more cement in the coming year, than they have in the past several years. I believe this condition is brought about largely through the increased prosperity that has visited the farmer during the latter part of 1925.

"Shipments for the last quarter of 1925 were somewhat below expectations, but this condition was brought about largely through inclement weather. Many projects that would have been completed in 1925, have been closed down temporarily, and construction work will proceed on these projects, as early as the weather will permit in 1926. I am under the impression that we should experience some early shipping instructions from these hold-over contracts. Taking just a passing glance at these conditions, I am led to believe that 1926 will measure up to expectations for the cement industry."

A. T. McCormack  
General Sales Manager, The Sandusky  
Cement Company

**Gordon Tongue says:**

"In the Pacific Northwest there is every indication that general building program and paving plans for 1926 will equal the totals of 1925. In the present year, we have had in this section of the country several large construction projects, including two immense hydro-electric plants which took a large volume of cement. There are no large jobs for 1926 to take the place of these projects. This undoubtedly will mean a decrease in the volume of cement consumed in this section next year as compared to 1925. However, there is no evidence of a let-up in the building and paving program and the year will therefore be a little better than the average.

"Foreign competition will undoubtedly continue to increase in strength and volume with consequent depressing result of the local production.

"Gordon Tongue,  
Sales Manager, Superior Portland  
Cement Company.

## Trends in the Use of Explosives

Developments in connection with explosives in pit and quarry operations during 1925 have been chiefly in the nature of increased consumption and greater attention to blasting practices, as seems likely to be the case for some years to come. More superintendents are realizing the value of making a survey of the ground for a shot and a systematic calculation of the burden to be moved in order to determine the proper spacing for the holes and the proper amount of explosive for the charges. Greater attention is given to safe methods of opening dynamite cases, loading the explosive and tamping the hole. Greater care is also being taken in connecting the blasting circuit and testing it in advance in order to prevent misfires. With an electric blasting cap in each hole, there are numerous wire connections to be made and it is essential for avoiding electrical trouble that each joint be tightly twisted and properly insulated. In deep well drill holes there is increasing use of cordeau running to the bottom of each hole with a surface line of cordeau. This method of firing eliminates a good many of the chances for electrical trouble, insures the instantaneous detonation of each section of a broken load and increases the execution of the dynamite.

With ammonia, gelatin, nitroglycerin and nitro-starch dynamites, R. R. P. and blasting powder of a high standard of excellence and uniformity available, the problem is to choose the explosive best fitted to the work and to use it properly. Where the material is only moderately hard and the holes are fairly dry, ammonia dynamite is still the explosive used in largest quantity, but in hard rock or wet holes the trend is steadily toward gelatin. This pulls the bottom and gives good fragmentation and is at the same time safer to use than straight dynamite, especially in well drill holes. Quarry Gelatin, which was introduced by the du Pont Company last year for open work, has proved to be a most satisfactory explosive. It is about 10 per cent stronger, grade for grade, than the regular gelatins. Consequently, in some quarries it has been substituted in a lower strength for the explosives formerly used with equally good re-

sults, while in other quarries it has been used in the same strength as the former explosive to get better fragmentation. In both cases the Quarry Gelatin results in a saving.

The greatest improvement in industrial explosives in the last decade has been the development of the low freezing dynamites. None of the explosives now made by the large manufacturers for use in producing the non-metallic minerals will freeze at any temperature that ordinarily prevails in this country. Operators have realized the value of this improvement especially during the past year when the demand for stone and other products of this industry has been large, for they have been able to carry on blasting throughout the winter without the hazards and expense involved in thawing frozen explosives. The feasibility of blasting the year around has probably been in at least some degree responsible for the great increase in the quantity of explosives used in pit and quarry operations.

### Blasting Accessories

A comprehensively illustrated booklet of eighty pages, entitled "Blasting Accessories," has just been issued by E. I. du Pont de Nemours & Company of Wilmington, Delaware. It gives complete and detailed data on the various accessories needed for firing charges of explosives, together with explanations of the best methods of using these accessories. It has been pointed out that accessories of the best grade cost very little in comparison with the explosives, the drilling of the holes and supervision of employes for the shot. It is therefore expensive to employ inferior firing agents, for their use always involves considerable wastage of explosives and may result in poor breakage or dangerous and costly misfires.

Mr. C. F. Phillips has been appointed representative in charge of Wilkes-Barre office of the Allis-Chalmers Manufacturing Company. Mr. Phillips, who was formerly connected with the Philadelphia office of the company, succeeds Mr. Guy V. Woody.



# Reviewing the Crushed Stone Industry

By R. N. Van Winkle

RECENTLY I overheard the remark that our branch of the non-metallic mineral field had outgrown the name "quarry business" and was fully worthy of the name "Crushed Stone Industry." This statement by one of the prominent men in our field sums up the recent developments, improvements and achievements in our work. Men in our industry have been untiring in their efforts to put it on the economic plane which merits it. I am informed that today there is more than \$300,000,000 invested in the business.

Results such as have been accomplished in the last few years in the crushed stone industry can only be accomplished by taking thought rather than by blind submission to drifts and tendencies. One's course of affairs can be shaped through intelligent planning. Rather than review past improvements, achievements and developments it is my desire to suggest improvements, developments or achievements that are possible for the future of the industry.

Unquestionably the trend of the times is for industrial consolidation. The federal government is urging the railroads to consolidate. We are all familiar with the activities of the International Cement Corporation along this line, while manufacturers and producers of coal, oil, shoes, automobiles, steel and even bread are consolidating and amalgamating, not to increase prices, but to gain larger returns by eliminating overhead, curtail waste, stopping duplication and by balancing their particular industry. For instance, on governmental investigation it was found that 14½ per cent of the boot and shoe factories of the country now produce 65 per cent of the industry's production and could make all of it. The balance of all the plants with their thousands of workers operate almost solely as an economic waste and tend to keep prices down and employment seasonal. It appears that the crushed stone industry with its many individual producers offers a fertile field for consolidation, which would turn what is now waste into profit by curtail overhead, reducing duplication of plants, stabilizing sales and operating forces, encouraging more effi-

cient management and bringing about standardized products and standard operating practices as well as sales practices which would bring prestige and prosperity to the industry.

Elbert H. Gary, Chairman of the United States Steel Corporation, recently told his associates and competitors that it was their own fault that they were not getting fair profits on their invested capital because they were trying for more than their fair share of trade resulting in competitions with consequent low prices. The merging and consolidating of individual crushed stone operations into sizable companies are economic necessities for the future of the industry and have been a means in other industries of turning losses into profits, reducing of overhead, bettering of service to customer, restoring of credit and cutting down the cost of production and distribution.

President Otto M. Graves of the National Crushed Stone Association is to be highly complimented on seeing through his idea of creating an Engineering Bureau for the Association. The crushed stone industry is also lucky in securing as the head of this engineering bureau a man like A. T. Goldbeck, formerly with the United States Bureau of Public Roads. Mr. Goldbeck will bring dignity and an invaluable fund of information which can be used in preparing sales and production data and statistics for the better use of crushed stone. It seems high time that some such combined action should be taken to stimulate, promote and defend the use of crushed stone, otherwise we might wake up to find ourselves in the same boat as the New England cotton mills, boot and shoe and woolen and worsted manufacturers who have lost, so it is said, a large part of their business to North Carolina, St. Louis and the Southern districts and Western centers. The sand and gravel the slag industries have unquestionably made big inroads on the stone business, but it begins to appear we soon shall be ready to cope with this situation.

It now appears that the National Crushed Stone Association, or the Crushed Stone Industry which it represents, is definitely and well fixed

to put on a campaign for the promotion of the use of crushed stone versus gravel or slag. When this engineering bureau gets to functioning, would it not be a good idea to attempt to create or form an Engineering Bureau to act as a clearing house for actual operating problems? The bureau already formed will doubtless furnish the data, statistics and information to show that crushed stone is the best and most economical. It will be a sort of Engineering Sales Promotion Bureau and will increase the demand and the use of crushed stone. Would it not be a good idea to have an Engineering Bureau whose duty it would be to investigate, experiment and recommend operating devices and operating practices looking to the eliminating of waste and the increasing of net profits in the industry? It may be of interest to know that the Cement Association has such a bureau or committee, which has been quite successfully functioning for some time. Sales promotion and production must go hand in hand, and the salesman or promoter must not promise things which the operator cannot fulfill. It is claimed, on good authority, that in American industry 40 per cent results in waste. Now the writer is not in position to say we have 40 per cent waste in the crushed stone industry, but we do have waste and the percentage might stagger us. Explosives, fuel, oil, power, labor and so on are constantly and continuously being wasted. If some committee or bureau could be formed to deal with operating problems and practices looking primarily to the curtailing of waste and the standardizing of operating practices, it seems plausible that the industry and our balance sheets would benefit.

All of us are quite familiar with the question, What are you paying labor? Labor is an important factor in almost every industry, but the crushed stone industry is meeting the situation brought about by the cutting off of immigration as are all other industries by introducing more labor saving devices and also cultivating the good will of the employees for greater efficiency. Figures based on report from the United States Department of Commerce show that common labor so far this year, 1925, has averaged 39 cents per hour for the United States as a whole. Last year at the same time it was 38 cents, in 1923 the average was 35 cents, and that of 1922 was 30 cents.

There is very little probability that next year common labor is to be cheaper, as restrictions on immigration are not alone working to lessen the supply of common labor by barring it from coming into our country, but it has caused many laborers already working here to return to their native lands because their families could not gain entrance to the United States. Common labor has been making important wage gains in the last three years, and where activities such as the crushed stone industry calls for men to do heavy work further increases may be looked for depending on to demand for common laborers.

Andrew Carnegie is said to have made the remark that if he had his choice of losing his organization or his plants, he would prefer to lose his plants, because they could be replaced more quickly and more easily than his organization. To my notion your organization, your faithful employee, your following of conscientious, reliable workers is one of the greatest, if not the greatest asset a man or company can have. Experienced quarrymen are getting harder to get each year, but if you have good men who are contented, laying by a little money for a rainy day who feel they have a personal interest in your business and you have a personal interest in their welfare, they are not going to be attracted away to some competitor or some other industry.

Quite a bit of publicity was given in Pit and Quarry recently to the forming of a Quarry Section of the National Safety Council. As the National Safety Council is organized for accident prevention work a Quarry Section should meet with popular favor. Co-operative participation by everyone will bring a wealth of satisfaction and a definite economic gain to the crushed stone industry and moreover every owner will make money on successful safety work; the insurance company will profit and the worker will be saved suffering and lives will be saved. This work of the Quarry Section should reflect in the elimination of accidents in the industry and as the curtailing of accidents gives "good experience" as the insurance companies term it, a reduction in Workmen's Compensation rates should be forthcoming.

The writer has never been satisfied with the rates quoted by insurance companies on workmen's compensation in the crushed stone industry. Let us take the compensation rates

charged for a switchman on a steam railroad. The natural rate on this man is less than half the rate charged for a man employed as a pitman around a steam shovel in a quarry. Which is the more hazardous occupation, a railroad switchman who climbs box cars in rainy and sleeting weather and jumps off and on moving cars day or night, or a pitman around a steam shovel in a modern quarry? Men employed around an iron mine, whether it be a surface or a shaft mine with or without explosives are charged less than half the rate for a quarry. The sooner the industry as a whole acts, the quicker relief will be obtained. The public and insurance companies too feel that the crushed stone industry is an ultra hazardous industry, while it is positively not as compared to other kindred lines, but no one is going to prove this or even promote the idea for us. If we want relief we must pull the chestnuts out of the fire ourselves.

This brings us to a subject of vital importance to those engaged in the crushed stone industry, "Scientific Management." One author has said that "Scientific Management" prescribes the destruction of tradition. Scientific management calls for the rapid alteration of viewpoints from perspective to close scrutiny, from preparation to execution. "It includes the culling out," as one authority has said, "of obsolete business ideas, the substitution of other means of paying labor than by the day basis, the discarding of unprofitable parts of business, the elimination of waste of both material and labor, the reduction of plant and equipment, the arrangement of men, handling of tools and a hundred other details." In the crushed stone industry work done in the past has been mostly in the mechanical branch of engineering or commercial manufacturing, such as steam shovels, drills, crushers, locomotives, etc. In the future the work should be in the quarries.

The crushed stone industry needs field specialists to handle problems of operation not covered by the mechanical branch of engineering which has been highly developed. It is true a man can learn scientific management, as far as field operations are concerned, out of books; a man might also learn to be a banker out of books, but not a good banker. There are several ways of bringing scientific

management to your field operations. One is by reading books and articles on the subject and applying knowledge so gained without the aid of expert outside help, and another way is to employ a man with some experience in this particular line and place him in your organization. If he is a high class expert or operator, he will be an expense possibly too great to carry in your organization; and if he is not a high class, trained expert or operator, practically every man in your organization will quickly be against him, or else he will fall in with those in charge and help keep in vogue your old systems and methods.

Still again by delegating this work to someone already in your organization, you will find that he quite often lacks the experience, has not the time or opportunity to change methods or try new ideas and if he does the expense in conducting experiments may be greater than the saving. With the outside high class, experienced expert or operator it is quite different. He must show results and make good in a limited space of time. Hired by the day, month or retained by the season he must, to be successful, effect savings that make his own fees or wages appear negligible, for if he does not do this his employment will cease. He is no part of your organization, nor bound by organization tradition; he can change methods; he sees your problems in a different light without sentiment, looks for efficient results only and may give you information regarding your own organization and operations that would be impossible for you to obtain first hand. Scientific management is not a fad; it is a necessity in the crushed stone industry, as it has been in manufacturing and in the trades for selling, where it has been a great success. Some of our biggest and most successful leaders and industries have come to realize that scientific management, efficiency engineers, or experienced experts are absolutely essential.

We in the crushed stone industry can learn much of benefit to ourselves in the successful handling of our own affairs from the trend and practices followed in other lines of endeavor and industry which are foreign to our own. We sometimes by too constant and close application to our own problems lose all sense of proportion, perspective and troubles which to us

appear large and irregularities which seem small and insignificant by reason of constantly encountering them are readily seen by a stranger or outsider as most costly and easily remedied. We should be interested in exchange of experiences and interested too in the work that is being done in other lines in so far as what we can learn can be applied to our industry. Remember we can all learn and that when a job grows too big for the man, a bigger man gets the job; but when a man grows too big for his job, a bigger job gets the man.

It would probably be a mistake not to say something about future business prospects in the crushed stone industry. There is little to say that is not optimistic. The steel industry is looking forward to a big 1926, the railroads are recovering and crop conditions are quite bright. While out here there is great carefulness in buying and the undertaking of any large construction programs, yet the fact remains, debts are being paid, interest and arrears are being wiped out and business is now above the dead level of bankruptcy to which a great many people thought we had sunk. With good crops which are now almost assured and fair to good prices for these crops, the crushed stone industry in this section can expect good business. We all being true Americans love to talk of the Good Old Days, as we call them, the days Abe Martin refers to when "Gasoline was only to clean white kid gloves" and "We had to wait until the middle of June for lettuce." Those days are not going to return to the crushed stone industry, no more \$1.75 a day labor or crusher run stone. Times have changed, the industry is in the hands of a different class of men and the writer questions if we would want to go back to the "good old days" if we could. Being true Americans we are sometimes apt to get the record habit trying to achieve a record production. Every industry seems to be imbued with this production record habit; an automobile manufacturer strives for a record breaking month in producing automobiles, a railroad has a record breaking month in moving freight, we are record breaking mad it almost seems. Still it does not seem logical that we can indefinitely hope to outdo our best or highest production record. If we do we are unquestionably in for a disappointment and will claim that business is rotten and

all shot when in fact it may be adjusting itself to its proper level. If good prices, sound banks and growing savings accounts are any signs of good times we should have good times.

### Mundy Issues New Catalog

J. S. Mundy Hoisting Engine Company has issued a new catalog describing their line of hoisting equipment. The catalog points out that all Mundy equipment is built on the duplicate by the system from standard gauges and templates. The light parts of each hoist are, therefore, interchangeable. The booklet is profusely illustrated and gives accurate descriptions and statistical data on all of the machines marketed by the concern and information as to what each model can be expected to do. The manufacturers make much of the low gas consumption, the sturdy construction and the use of asbestall metallic non-burn friction blocks offered on all new Mundy hoists. These blocks are made of asbestos fibre, fine placed wire, and a binding compound, and vulcanized under heavy pressure in metal molds. It is claimed asbestall frictions will not absorb oil or moisture and will not warp. The brakes of the Mundy hoist consist of a brake band lined with asbestolin, a brake shaft and chute treadle. The shaft is milled square on one end for the treadle, which is counterbalanced with a weight. The same qualities are claimed for asbestolin as for asbestall frictions.

### New Allis Chalmers Branch

Allis-Chalmers Mfg. Co. is opening a branch sales office at Houston, Texas, in charge of R. I. Moore, who was previously located in their Dallas office. Temporary quarters are at 231 Rodgers Building and after the first of the year the office will be located permanently at 1108 Post Dispatch Building. With the establishment of this office, the company will be able, more effectively, to serve its many customers in this territory. The Houston office will be operated as a branch of the Dallas district, of which F. W. Burbank is District Manager.

The type D-54 mechanical drive turbine, intended for the driving of centrifugal pumps, blowers and other classes of mechanical drive, is described in Bulletin GEA-197, just issued by the General Electric Company, Schenectady, N. Y.

## The Crushed Stone Industry for 1926

**Otho M. Graves says:**

"Nineteen twenty-six will be an interesting, if not epochal, year for the crushed stone industry. There is a tendency on the part of the railroads, as evidenced in the proceedings Ex Parte 87, to increase the rates on certain commodities, of which stone is one, in order to offset a decrease which may possibly be ordered by the Interstate Commerce Commission on farm produce. Any increase in delivered price of crushed stone is a matter of serious concern to producers. In Docket 17,000 the I. C. C. will enter upon an examination of the general freight rate structure as ordered by Congress through the Hoch-Smith Act.

"General building construction will probably be about as heavy in 1926 as in 1925, though if any difference is apparent it will probably be a decrease. Highway construction will probably be prosecuted even more vigorously in the coming year than in the present one.

"Prices should, and probably will, remain about the same, though the increase in competition between the several aggregates, with the increasing tendency to develop roadside pits and quarries, tends to force downward the delivered price of stone almost regardless of the cost of production plus a fair profit.

"The Bureau of Engineering of the National Crushed Stone Association has been established at an opportune time for the impartial investigation of problems concerning the production and use of aggregates. There is no reason to believe that 1926 will bring any misfortune of the industry and we should look forward hopefully to a reasonably successful year, but, notwithstanding, considerable attention should be paid to reducing costs of operation and overhead, though at the same time expecting a production fully equal to that of 1925."

Otho M. Graves,  
Pres., National Crushed Stone Assn.  
Gen. Mgr. The General Crushed Stone Co.

**W. L. Sporborg says:**

"It seems to me that in the region where we secure our business, the requirement for crushed stone will be during the year 1926 about the same in quantity, or perhaps a little more,

than during the year 1925. The major divisions or classes of our commodity will compare, in my opinion, as between 1926 and 1925 as follows:

"Railway Ballast, probably about the same.

"State Highway and County Construction, about the same—probably a slight increase.

"Building Construction, probably no change.

"Public Works within Cities, including street paving, about the same and possibly an increase.

"We expect that our sales will be about the same next year, with perhaps a small increase in the total, but probably no decrease. We expect that the price level will be the same next year as this year, so far as we are concerned. We do not expect that there will be any material changes in costs, and therefore our production costs will probably be not materially different next year.

"At this time in the year, we have found in the past that it is impossible to make a forecast without a rather large element of guess work. We do believe, however, that our business will go along through the years with relative minor changes from year to year. We think that the crushed stone industry is a permanent industry and that there will always be a need and a demand for our commodity. We do not see any important change in conditions that will have the effect of permanently injuring the crushed stone industry to any material extent."

W. L. Sporborg,  
Pres., Rock-Cut Stone Company.

**John J. Sloan says:**

"It is my opinion that a busy season lies ahead for the following reasons: First: The conditions of easy money. Second: The increased earning powers of the railroads with the heaviest freight movement in history.

Third: The added purchasing powers of the farmers due to increased values that are said to total a billion and a half dollars.

Fourth: The increasing percentage of operation in the steel and iron industry and many other lines.

"The railroads will require ballast. The steel mills need flux. The increased prosperity of the country will call for a continuation of good roads

construction. Hundreds of millions have been recently voted in different states and counties for improvements, and the general building program is still continued at peak figures with every probability that while the type of construction may change, the volume in materials that pertain to our industry will be equal. With service and delivery, with fairness in price quotation and proper attention to quality, the producer of aggregates has not much to worry about, except to attend to business, and stay on the job."

John J. Sloan,  
Secty., Wisconsin Granite Company.

**T. Frank Quilty says:**

"I am optimistic as regards the year 1926 and the prospects not only are good for Flux, Building and Road Stone, but also for Agricultural Stone. The demand for the latter commodity in the year 1925 was good for the first time in five years and 1926 should be as good or better. I base this opinion, First, on the fact that the farmers are now educated to the point where they appreciate the value of Agricultural Limestone; Second, they are, generally, in a financial position, which enables them to purchase it.

"Crushed stone for road and street building should be in good demand in this territory for the reasons that: the city of Chicago has a large street building program and the suburbs surrounding the city are growing rapidly and consequently increasing their stone requirements, while at the same time it appears that the state and county road program will be above normal.

"The production of Iron and Steel in the Chicago district is increasing, consequently the demand for Flux will correspondingly increase."

T. Frank Quilty,  
Pres., Superior Stone Company.

**Chas. A. Freiberg says:**

"From general observations, I would state that the year 1926 will be about the same as the year 1925. From all indications the future for the crushed stone industry does not look very promising. We are not pessimistic, neither do we wish to assume that attitude, but since there is strong competition in the mineral aggregates industry, the crushed stone industry will have to work hard for a portion

or its share of the business to be had during the coming year.

"General opinion seems to prevail that the next year should demonstrate which of the mineral aggregates, such as stone, gravel and slag, is better for concrete construction work, especially new road construction."

Chas. A. Freiberg,  
Gen. Mgr., Buffalo Cement Company.

**W. Scott Eames says:**

"The construction work in New England was 35 per cent greater in 1925 than in the previous year of 1924. In the year of 1926 it is expected to be equal, if not better than 1925. The only cloud that can be seen now is the question of the Tax Exempt Bonds, which are now being issued by the States, Counties and Municipalities. If this new tax law goes into effect and sur-tax reduced, the feeling is the Tax Exempt Bonds will not be as readily sold as in previous years. For this reason it may curtail and prevent a large amount of public works improvements in 1926 where these Tax Exempt Bonds always have been available and easily sold at a premium. The great demand on our present Congress is to reduce the sur-tax, expecting large volumes of business will go into other channels. How soon this will be made possible one cannot tell at the present time. This evidently will be curtailed after the passage of the bill, affecting public works later in the season."

W. Scott Eames,  
Gen. Mgr., The New Haven Trap Rock Company.

**Wm. M. Andrews says:**

"The State Highway Departments in our vicinity have not yet announced their 1926 programs.

"One of the most important things to our mind is the present chaos in freight rates. We feel there should be a concerted move on the part of the crushed stone industry to place all road building aggregates on the same basis.

"Slag has been making great inroads in the crushed stone business in our territory, largely because it enjoys much lower freight rates. Unless something is done very soon to equalize these rates the crushed stone industry will be forced to the wall wherever it meets slag competition.

"While it may seem to be purely a local matter the slag interests are gradually extending their plants and

reaching into new territory. It is only a question of time until they will cover almost all territory east of the Mississippi River. The stone industry cannot make a start too soon to combat these low freight rates."

Wm. M. Andrews,  
Secty., Lake Erie Limestone Company.

**Harry H. Brandon says:**

"From present indications, we expect a better year than 1925 has been. Ohio is going ahead with its road building program, at least on as great a scale as heretofore and possibly greater.

"Cheap corn and high pork prices are making money for the Ohio farmer, this means greater prosperity which will reflect in general business conditions, which is bound to carry the stone business along on the crest.

"Prices have remained fairly constant in 1925 and if there is any change it will be upward. There are no stone quarries in Ohio that are worrying about next year, there is no scramble to tie-up big jobs at low prices, and there is enough unfinished work carried over to give a reasonably early start to Spring shipments."

Harry H. Brandon,  
The Ohio Marble Company.

**I. W. Wortman says:**

"Business for 1925 was not as good as expected for our particular plant. I think the industry as a whole for 1925 in this section was about ten per cent better than 1924. We anticipate an average year of business for 1926. Making comparison for 1925 for our particular operation we hope it to be twenty-five per cent better. Prices will be perhaps slightly lower, wages about the same."

I. W. Wortman,  
Secty., North Jersey Quarry Co.

**A. L. Norton says:**

"From all accounts that reach us, there is going to be a 'Bumper Crop' of orders for crushed stone for 1926 in our section of the state. The Highway Department has announced a broad program of both continued building and the broadening of roads already improved, both concrete and macadam roads being slated for widening during the 1926 season. In addition, the desire for first class roads is keenly felt by the counties and towns, and the stone that will be trucked away the next season for all kinds of local improvement bids fair

to almost interfere with the regular shipment of stone to more distant points by freight. We have every reason now to feel that the 1926 season will be the largest we have yet had."

A. L. Norton,  
Pres., Norton Stone & Lime Corp'n.

**E. J. Krause says:**

"It would appear that the peak had been reached in general construction including hard roads. It would also appear that a very large potential capacity for the production of crushed stone had been built up amply sufficient to supply the peak demand, and in some districts there is now an excess of the potential capacity. How many years construction will stay at the peak is difficult to say but it is reasonable to assume that it will last through 1926.

"When the demand falls off, having in mind the tremendous potential capacity, producers will feel keenly the lack of market. Witness the coal industry with the tremendous potential capacity built up during the war and the complete collapse of that industry when the market could not absorb more than half of the capacity. I believe it is time to be cautious."

E. J. Krause,  
Pres., Columbia Quarry Company.

**R. B. Tyler says:**

"The year 1925 has not been so good for the crushed stone industry in this state, due mostly to the fact that the State Highway Department got in arrears on their contracts and had to stop their operations in this state until they caught up with their incoming revenue for road purposes. Therefore there has been very little work in this state this year.

"The Highway Department will be paid up, and out of debt by July 1, 1926. The proposed program in this state for next year is that there will be considerable road work let in the early spring. Our Highway Department will have something like fifteen million dollars to spend for roadways in this state.

"I understand also that the railway companies will be in the market for considerable stone ballast during 1926. It now looks like the crushed stone industry for the year 1926 can look forward to a very prosperous year."

R. B. Tyler,  
Pres., R. B. Tyler Company.

**S. Peabody says:**

"The crushed stone industry has had a large tonnage this season and I look for as much business, if not more, next year. Crushed stone has proven its worth in practice, and with more education from the dissemination of its advantages, will be used more and more as time goes on. It is the duty of all producers of crushed stone to see that their product is not condemned when it is used with low grades and improper proportions of cement and other building materials and to see that all building projects in which crushed stone is used are handled on a sound engineering basis.

"When the men who have their money invested in the crushed stone industry fully realize the damage that is being done to their business by crushed stone being blamed for all weaknesses or unsatisfactory conditions which later develop in masonry work and are willing to devote some of their time, thought and money to stopping this growing practice, many of the now existing prejudices against the use of crushed stone will be removed. If all of us would join in the work Professor Goldbeck is doing, giving this work our moral and financial support, everlastingly trying to correct mistaken impressions and impress upon our engineers, architects and builders the advantages of crushed stone when properly used, our product will be in greater favor and enjoy more permanent markets. "I feel that the price situation may properly be mentioned. There are localities in which producers are getting a fair price and a reasonable return on their investment. There are other sections in which investment and depreciation are entirely ignored. Prices are made without business reasoning, and until producers give more consideration to cost factors than they do to tonnage and decide to operate only on a definite merchandising basis, this chaos will continue. Pride and revenge are dangerous and ruinous factors in any business.

"There seems to be a need in the crushed stone industry for a unified basis of selling, either by weight or by measure. Because of this lack of standard practice, some sellers are losing money and in other cases buyers are losing money. It does seem that a proper standard could be determined which would be fair to all buyers and all sellers and such stand-

ard should be adopted universally.

"The crushed stone industry might save the man who ultimately pays the bill considerable if architects, contractors and producers could join forces so that fewer sizes would be made and a thorough understanding reached on the percentage of impurities and undersizing allowed in the different sizes."

S. Peabody,  
Consumers Company.

**E. C. Dodson says:**

"Barring a tie-up of State and Federal funds in Texas by litigation, the outlook is very bright for highway construction in Texas during the year.

"Texas is prosperous, needs the highways and able to build them, and will build them. It is my further belief that owners and engineers are gradually realizing the superior value of crushed stone aggregate in general construction, which should result in an increased demand for crushed stone. Hence, we believe that the 1926 outlook for the crushed stone industry in Texas is good."

E. C. Dodson,  
Vice-Pres. and Manager Texas Stone Products Co., and Chico Crushed Stone Co.

**M M Bamberger says:**

"Our prediction a year ago that 1925 would be a big year in our territory has been verified; in fact, exceeded our most optimistic expectations, both as to tonnage and price; from all indications and information we have, 1926 will equal if not exceed 1925."

M. M. Bamberger,  
Pres., Interstate Crushed Stone Co.

**F. R. Upton says:**

"We do not look for over ten per cent increase in business and rather expect a slight reduction, possibly five to ten per cent from the selling price."

F. R. Upton,  
Pres., Bound Brook Crushed Stone Co.

**Harry Lancaster says:**

"There will be considerable work done on the State Highways, no doubt, also the building of Overhead Crossings. These in connection with our regular ballast and commercial business is all we can call to mind at present."

Harry Lancaster,  
The L. & M. Stone Co.



**A. B. Rodes says:**

"We believe that next year will be a good year for this industry. From the point of view of the industry as a whole, we believe that our Association has laid broad and progressive plans that will result in the universal recognition of the superiority of good crushed stone where permanent construction is desired.

"Locally the prospects are good for another good year next year in this industry. Our entire territory is rapidly constructing good roads, which in addition to the rapid development and progress of the entire South indicates that 1926 will be a good business year."

A. B. Rodes,  
Franklin Limestone Company.

**W. H. Wallace, Jr., says:**

"The outlook for next year is exceedingly favorable at this time. Last year at this time it also looked very favorable, but owing to the uncertainty over our gas tax and all, it turned out to be a low average year, and it was Federal Aided roads which gave us a large percentage of our business. Next year some of our strong adjoining counties have considerable work planned, and the outlook is very favorable."

W. H. Wallace, Jr.  
Treas., The Wallace Stone Company.

**H. E. Bair says:**

"From present indications in the territory we serve, we feel that the demand for crushed stone will be about the same during 1926 as it was during this year. We also look for a slightly higher price level to prevail."

H. E. Bair,  
Gen. Mgr., The France Stone Company.

**G. A. Hunter says:**

"We believe that the outlook for business in the stone industry for 1926 will surpass any years in the past, both in road construction and building."

G. A. Hunter,  
Treas., F. E. Conley Stone Co.

**Thos. Sullivan says:**

"We expect a greater demand for crushed stone in 1926 than prevailed this year because more funds will be available from gasoline taxes, etc."

Thos. Sullivan,  
Secty., National Stone Company.

**Edgar Lunn says:**

"The prospects for the Indiana limestone industry are very good for the year 1926. We expect next year to be as good if not better than 1925."

Edgar Lunn,  
Secty., Indiana Limestone Quarrymen's Association.

**A. L. Worthen says:**

"The State Highway Department of Connecticut is contemplating a large road building program for the year 1926, and we shall prepare for a rather larger production for 1926 than we have handled this year."

A. L. Worthen,  
Vice-Pres., The Connecticut Quarries Co.

**Acme Limestone Company says:**

"It seems to us that there is a general improvement throughout the country, and this is particularly true of West Virginia, in view of the fact that West Virginia Coal is beginning to come into its own. In West Virginia this improvement in the coal industry will reflect itself in all the industries throughout the state, and the crushed stone business will be no exception. Consequently we look for a nice business for the year 1926."

Acme Limestone Company.

**Osgood Changes**

Mr. T. L. Pitts, sales representative for The Osgood Company at Charlotte, North Carolina, has been promoted to Division Sales Manager with charge of sales in the South Atlantic Seaboard Territory. Mr. Pitts has appointed M. D. Moody of Jacksonville, Florida and I. W. Phillips of Tampa, Florida to represent The Osgood Company in their respective territories.

**Westinghouse Change**

Mr. W. F. James has been appointed Manager of the Philadelphia District of the Westinghouse Electric and Manufacturing Company, succeeding Mr. H. H. Seabrook, who has been assigned to special duties. Announcement of the changes were made by E. D. Kilburn, vice president and general sales manager of the Westinghouse Company.

## What's Ahead for the Slag Producer

**Geo. A. Mattison, Jr., says:**

The southern field in the slag industry has a rather bright outlook for the year 1926, unless some unforeseen difficulty presents itself. Our country as a whole has just awakened to the possibilities of this Southland of ours, and, as a result, the South is enjoying a rapid expansion with an influx of outside capital, and labor in addition to its own resources.

"Georgia, Florida, Alabama and the Southeast in general is being benefited daily and are preparing to meet progress with better roads, more hotels and other public buildings. This being the beginning of the "Concrete Age" it is quite natural that in looking for an aggregate for concrete, the slag producer cannot be overlooked.

"Slag as an aggregate for concrete is equal to any gravel or stone and is superior to most. It is considerably lighter than either, which is an added factor in its favor, permitting it to be shipped in competition to stone or gravel over a much larger radius when freight rates are the same. This holds true in the tracking from railroad to the job, and last, from the purchase of the material itself as a saving of approximately 25 per cent is made per cubic yard due to the lighter weight of slag.

"Alabama is now figuring on a bond issue of \$75,000,000 for road work, and it is rumored that a special session of the legislature may be called at an early date to consider this. There are now, under course of construction, and recently completed projects in Alabama, costing several million dollars, which is only a starter for what is to come in this state.

"Georgia has recently voted and has pending bond issues close to the ten million mark, and practically all of this is to be used in road work and paving.

Florida, which is now in the midst of a tremendous boom, which has attracted world wide attention, is a fertile field for 1926. At present all points in Florida are embargoed by railroads, but the situation should be eased during December and January, and shipments be allowed. A book might be written regarding Florida possibilities. Some figure the boom to last indefinitely, while others say

it is only a bubble which is likely to burst at any moment. Either way, Florida is certain to prove a fertile field for slag in 1926. While real estate values may be beyond reason at this time, and highly inflated, there is no possible chance for them to go back to the old level, and a good average business is anticipated from Florida during 1926.

"Mississippi and Louisiana on our west and the Carolinas on our north-east are showing a progressive trend with the continuance of same assured for 1926.

"We are very optimistic in this section, and feel that the South in general is going to have a rise in prosperity in 1926 and that the slag producer in this section will have a profitable year."

Geo. A. Mattison, Jr.,  
Vice-Pres. and Gen. Mgr., Woodstock  
Slag Corporation.

**C. L. McKenzie says:**

"The general feeling is that the prospects for the year 1926 in the 'aggregate' producing industry are as good as they were in the year 1925, and the feeling of manufacturers is optimistic and hopeful of a good demand for all kinds of supplies.

"The railroads are in good position (by reason of earnings) to make improvements including trackwork, terminals, etc., and in connection with public improvements, much money is being spent and considerable balances are available. The public demand for highways, sewer systems, etc., is great and possibly still growing as a result of realization from experience of the convenience and economy resulting from previous improvements.

"It seems likely that there will be some labor scarcity, but probably not a serious one unless the wave of industrial prosperity carries further than seems reasonably possible. There seems to be no reason why any very serious transportation difficulties should arise.

"Altogether the year 1926 promises a good volume of business, but all industries no doubt will have to do closer, harder work and follow improved methods to do as well as heretofore."

C. L. McKenzie,  
Pres., Duquesne Slag Products Co.

# Lime Industry to Face Many Problems During 1926

By Oliver Bowles

Superintendent, Non-Metallic Mineral Experiment Station\*.

**E**XPANSION of the lime industry depends, to quite an extent, on keeping down production costs. For some important uses keen competition with substitute materials renders low cost an imperative condition for extension of the use of lime. In those fields of utilization where lime is regarded as essential, the spur of competition may not be in evidence, but a wider use may be expected where the price is moderate, for many manufacturing or construction industries expand or contract according to fluctuations in the cost of their raw materials. A lime manufacturer once told me, "It makes no difference to me if the price of coal is doubled, I pass the increased cost on to the consumer, and he pays the bill." If this manufacturer is fortunate enough to have an exclusive market that will not be affected by such an increase in price the statement may be true, but in general it may be assumed that any marked increase in price will affect the producer even though similar increases are made all along the line by other lime producers.

Substantial increases in selling prices tend to slow up sales through use of substitutes or through stagnation in enterprises that use lime, an inactivity induced by the high cost of raw materials. If increases in fuel costs, or other costs, are beyond the control of the producer, efforts should be made to accomplish corresponding reductions in other ways.

## Avoidable Fuel Waste

There is probably no branch of lime manufacture that offers a more promising field for cost reduction than that of fuel. A great variation in fuel ratios (tons of lime produced per ton of coal burned) has been noted, and in many instances low fuel ratios may be traced directly to kiln design or operation. At one plant having a low ratio the writer found that the steel shells of the kilns were so hot one could scarcely hold his hand on them. A tremendous waste

of heat through radiation was due to insufficient insulation. At other plants the kilns are too short or of too small capacity and much heat passes away through the stacks that might be employed in preheating stone. Low fuel ratios may be due in part to poorly constructed or poorly operated cooling chambers. The writer has observed kilns where the lime is drawn in a white hot condition which results in high heat losses. A system whereby the draft may be drawn through the cooler has the double advantage of cooling the lime quickly, and conserving heat by preheating the air supply to the kilns.

One of the highest fuel ratios that has come to the writer's attention (a maximum of 5½ tons of lime per ton of coal) was obtained at a series of kilns which combined three important heat conserving features. The first of these was efficient insulation. The kilns were lined with two thicknesses of fire brick outside of which were 3 feet of clay and a heavy concrete wall. A second heat conserving feature was a flare at the tops of the kilns giving capacity for stone sufficient for two or three days' burning. Thus much heat that would otherwise be wasted was conserved in preheating the stone. The third feature was an efficient cooler. Fresh drawn lime could be picked up in the bare hand without danger of a burn.

With the prospect of higher-priced rather than lower-priced coal, it is expedient that lime producers direct increasing attention toward better fuel ratios. A study of the types of fuel best adapted for lime burning and the development of more scientific firing would tend to reduce fuel costs. The use of waste-heat boilers on rotary kilns would greatly reduce fuel costs. Many portland cement companies have installed waste heat boilers with very satisfactory results, but with one or two exceptions lime manufacturers have not yet introduced them.

Thousands of tons of coal are used every year to provide a jet of steam under the grate in most lime plants. The real office of steam, and its advantages are little understood. So

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confusing is this question, and so many different opinions have been expressed that the Non-metallic Minerals Experiment station of the Bureau of Mines is now conducting tests to determine if possible the effect of steam on limestone calcination. Possibly the same or better results could be attained by employing flue gases under the grate (the Elred process).

#### More Durable Kiln Linings

Much yet remains to be done in the development of an efficient refractory kiln lining. A poor lining demands frequent renewal, a task which is costly, and which cuts down production by keeping kilns in idleness. Not only must the brick withstand fairly high temperatures, but also the more or less violent abrasive action of the moving stone. One producer found that as crumbling began along the joints between the bricks, an increase in the size of the bricks with a corresponding decrease in the number of joints, tended to prolong the life of the kiln lining. Some operators keep a record of kiln linings not on a time basis, but on the more definite basis of lime tonnage that passes through the kiln. A thorough study of the kiln lining question by competent authorities on refractory brick is a problem that all forward looking lime manufacturers should keep in view.

#### Depletion of Easily Available Rock

The problem of cheap and adequate rock supply is always in the forefront. Naturally the most favored limestone outcrops are worked first. In some localities, supplies are being rapidly depleted, a condition which can be met only by charging off the entire investment, if that is possible, or by acquiring additional limestone areas. In other localities, and this is the most usual condition, the potential supply is adequate for many years, but the rock is becoming less and less easily available. This may be occasioned by the necessity for working at greater depths, or that of removing an increasingly heavy overburden. Thus while the operator may not be confronted with the specter of rapid depletion, he may have to face increasing quarry costs.

No one can say off hand just what depth of overburden may be profitably removed, for conditions vary so greatly. Even a very moderate depth is sometimes a serious handicap, while in other places an almost unbelievable depth of soil may be removed at

a nominal cost. As in the case of fuel ratios it is largely a question of skillful handling and efficient equipment. As an example of what can be accomplished mention may be made of a quarry visited by the writer where a depth of 15 to 20 feet of soil is removed from a 25-foot ledge of stone used for crushing, and the stripping charge against the stone is only 5 cents a ton. This is accomplished by the efficient use of steam shovel equipment, and by stripping in slack seasons.

Where the overburden becomes excessive, or where conditions are unfavorable for cheap removal the operator may be obliged to face the problem of underground mining. Such a method presents no insurmountable difficulties, and, under favorable conditions, is less costly than open pit quarrying with a heavy overburden. Active operations in limestone by underground methods are now followed in over 60 localities in the United States.

The above are just a few of the outstanding problems confronting lime manufacturers at the dawn of the year 1926. The lime industry is facing its many problems courageously and effectively, and new complexities that are bound to arise will no doubt be met in the same way. Two important essentials of future success are foresight in regard to trends and tendencies in the field of utilization, and alertness regarding developments in process and technique, not only in the lime industry itself, but in related mining and manufacturing enterprises.

#### Missouri Valley Association Meet

The Missouri Valley Association of Sand and Gravel Producers will hold their Seventh Annual Convention at the Kansas City Athletic Club Thursday, December 17th. The meeting will begin promptly at 9:30 o'clock, and last but one day. The entertainment will be furnished by the Kansas City Producers. The ladies of the sand and gravel families are especially invited to be present.

At a recent meeting of the board of directors of the Prest-O-Lite Company, Inc., Mr. M. J. Carney, formerly president was elected chairman of the board. Mr. William F. Barrett, formerly vice president, was elected to the presidency. Mr. Ralph R. Browning was elected vice president in charge of acetylene sales activities.

## What's Ahead in the Lime Industry

Fred Witmer says:

"It is interesting to note that the business throughout the year 1925 was even better than we had anticipated at that time. According to building reports published for various statisticians, the demand for steel, the demand for coal and the greater purchasing power of the farmer, we would predict a good demand for building materials throughout the early part of 1926. It seems that during the past several years we have made some real progress in catching up with the building program. During this time the standard of living appears to have increased and a number of the old places of business, including office buildings, hotels, theaters, churches, etc., have become obsolete. This year had the largest October construction volume on record, according to F. W. Dodge Corporation. Building and engineering contracts awarded during the month in the 36 Eastern States (which include about seven-eighths of the total construction volume of the country) amounted to \$519,528,200. This was 27 per cent greater than the volume of the month of October, 1924.

"The entire construction volume of last year, which was the record year to date, has already been exceeded in the first ten months of this year. Construction started during the past ten months has amounted to \$4,846,266,900 compared with \$4,479,307,060 for all of last year and with \$3,772,593,500 for the first ten months of last year. The increase over the 1924 total has been 8 per cent; over the total for the first ten months of last year, 28 per cent.

"The banks throughout the country appear to have plenty of cash available and practically every line of business is prosperous. Labor generally seems to be well employed and the purchasing power of the country is increasing. Settlements with foreign nations have a good moral effect on business.

"The earnings of the railroads would indicate that their purchasing power has been increased, the volume of business has been exceedingly large; in fact, the volume in one of the southern states has been so large that an embargo had to be placed almost a month ago against all non-

perishable freight, including building materials.

"The business of our country has probably never been in better condition than it is today. There is also a large amount of cash available to finance future construction work. The writer will predict that we will have a very good volume of business throughout the coming year. Competition may be a little keener on account of the increased capacity of plants but the live manufacturer and merchant should have an opportunity of earning a reasonable profit.

"Our company is now increasing its manufacturing facilities to take care of about 60 per cent greater volume of business throughout the year 1926."

Fred Witmer,  
Gen. Sales Mgr., The Ohio Hydrate  
& Supply Co.

R. L. Bogart says:

"It has been suggested that the building boom is rather likely to flatten out in the coming months. If this be true, it naturally will affect all lines of business, whether directly connected with the construction operations or not.

"At the end of June, 1925, this year's construction was fifteen per cent ahead of last year's construction volume to date; at the end of October it was twenty-eight per cent ahead of last year's volume to October 31st, and eight per cent ahead of last year's total volume. These statistics are compiled by a well known statistician for a large corporation. It is conceded that the last four months, 1925, showed an enormous volume of building business. During the last twelve months, building and engineering contracts have been awarded in the United States at an average rate of \$529,000,000 a month, or more than \$6,300,000,000 worth in the year ending October 31st. This is on an average of \$160,000,000 more per month than the previous building boom that ended May, 1920.

"The charts compiled by people who claim to know, show that the construction curve has been steadily on the upward trend during the last five months. Their records have a tendency to show that the amount required at the end of the war has about been taken care of. Certain classes of construction naturally have lagged

behind, and this, the writer believes, is particularly true of industrial construction. It is conceded, therefore, that the building boom has actually reached its peak and it is time to stop thinking of building demands in terms of shortage, and to think of it more along the lines of growth requirements of population, trade and industry and the demand conditioned entirely by continued business prosperity.

All indications point to the fact that there is plenty of capital to take care of any necessary building and there is no particular reason for complaining about the outlook for 1926. Naturally, the lime business depends primarily upon the building business for its output and when the building business is good, the lime business is good. Taking into consideration the number of building permits granted throughout the country and the very fact that the small towns and rural districts have been more or less neglected and the further fact that all over the country there is a cry for low rent housing facilities would seem to indicate that 1926 should be a very good building year. It is the writer's opinion that there will be a decline in the building business for some little time. This does not necessarily mean that it will affect the general business of 1926 and it is doubted that this decline will really make itself felt for many months to come.

"Regarding the other fields in which lime is used, namely, chemical and agricultural, it is our opinion that the chemical requirements will come along just as they have in the past, with increases here and decreases there. Regarding the agricultural field there has been so much propaganda put forth by the government and by everyone interested in liming the soil that we are looking forward to a banner year on this material for 1926. There is every reason to believe that the farmer trade realizes more and more the absolute necessity of putting more back into the soil than they take out of it, that we are not at all alarmed about this particular trade. It should be more and more uniform every year."

R. L. Bogart,  
Palmer Lime and Cement Company.

**Loring A. Cover, Jr., says:**

Frankly, the outlook for the industry on the whole is a little uncertain. We feel that the agricultural field

has greatly improved, and that there will be an increasingly large tonnage used in the spring and fall season. The demand for building lime will be probably less than last year.

"Chemical lime consumed by the chemical trade in general will be about the same as in 1925. Probably the total lime tonnage moved will be approximately the same as last year, the tonnage gained in one field being lost in another."

Loring A. Cover, Jr.,  
Asst. Dist. Sales Mgr., North American Cement Corporation.

### Booklet on Lime Uses

The Gruendler Patent Crusher & Pulverizer Company is coöperating with the lime dealers country by means of a profusely illustrated 48 page booklet entitled "Folks and Fields Need Lime," by Ralph A. Hayne of the Agricultural Extension Department. Mr. Hayne points out that a limestone country is always rich, but a sour soil means an impoverished agricultural locality. The booklet shows that practically all the soil east of the line running from the Canada border through the heart of Minnesota, then jumping to the center of Nebraska and wavering south to the Rio Grande a little west of the Gulf, is in need of lime. Not only does Mr. Hayne take up the need of lime for the soil, but its importance in animal life. Illustrations show the amount of lime in the human body and animals and its necessity for bone and muscle building. He shows that lime not only makes bigger crops, but it gives the fertilizer a chance to get in its work.

The book is divided into such divisions as "The Garden Needs Lime," "The Orchard Needs Lime," "The Lawn Needs Lime," "Lime Makes Good Pastures," "Lime Helps to Get Plant Food from the Air," "Lime Makes Manure Worth While," but the writer does not confine himself to discussions of the use of the product. He gives a highly interesting discussion of what becomes of lime in the soil, and tells how tests can be made for the lime content of earth. The farmer is given plenty of technical information on its use, and the whole discussion is so interesting that it is hard to believe any one who picks up the pamphlet will put it down until he has finished.

# The Progress and Practical Value Of Highway Research

By A. T. Goldbeck

Director of Bureau of Engineering, National Crushed Stone Association.

**R**ECENTLY a prominent engineer made the statement "Science is now advancing so rapidly and the results are so far reaching in their influence, that no industry can hope to forego research and live." This statement probably epitomizes the attitude of those in charge of large undertakings toward scientific study of operating problems. Research is vital to any large manufacturing undertaking no matter what the industry, for newer and cheaper processes must be discovered, uses must be found for waste products and better methods of meeting competition must be created.

How appropriate the remark of this engineer is to the field of highway construction and the production of road materials is readily recognized for the possibility of tremendous savings is always apparent in any undertaking in which the materials are manufactured in thousands of tons and the construction site extends over thousands of miles. Under these conditions an error constantly repeated whether in the manufacturing process or wasteful operation soon amounts to appalling figures. This makes research methods vital, so that not only the final product be entirely suitable but that it will reach this stage through the most direct and economical method.

Highway research is not a modern undertaking, for investigations, although they may have been crude, undoubtedly led to the adaption of lime mortar joints in the roads on ancient Rome and in the use of bed sand under the four successive layers in masonry of which these roads were built. In modern times, the road building ideas of Tesaguet, Telford and McAdam were not conceived without painstaking observation and experimentation. Their efforts were successful but were directed to the production of roads which would be suitable for the particular traffic problems then existing.

The traffic problems did not remain constant. The load a road was forced to bear increased so rapidly that the

highway engineer faced the necessity of discovering more suitable designs and types of construction. The increasing use of the fast moving automobile necessitated the discovery of suitable means of binding the roads together. Research immediately tackled the problem of finding what types of bituminous binders should be used under different climatic and traffic conditions. Much time was spent in the laboratory and the field on the proper methods of building concrete, brick, bituminous and other types of wearing surfaces, before the question was answered. But with a new generation came a new problem. The motor truck appeared on the road and each year it grew heavier and heavier as the economies of large units for certain types of hauling were revealed. The highway engineer again was confronted with a new question. How should he design a road that would carry extremely heavy units of traffic and yet would not be of prohibitive cost? He knew that his problem in the laboratory must be answered quickly for highway construction in the United States was requiring the expenditure of approximately a billion dollars a year.

The various highway constructing agencies were faced squarely with the problem of discovering ways of building roads for heavy trucks during the War, especially in 1917 and 1918, when so many failures took place under the fleets of army trucks. The possibility of general freight traffic increasing many fold in the future was even before our highway departments and many engineers began to consider ways of building highways for heavy traffic. The most important problem for research became that of obtaining data for the economical design of roads to carry heavy wheel loads and that problem is being solved with much success.

## Road Subgrade Research

When an engineer is considering the load carrying ability of any structure he thinks first of the support offered by the subgrade which ultimately receives the entire load. Road

subgrades have caused a great deal of trouble and this is accentuated in the present days of heavy wheel loads. The United States Bureau of Public Roads was perhaps the first road building agency to recognize the extreme importance of subgrade characteristics and for the past five years it has been conducting an intensive study of the various phases of the road subgrades and the effects its varying characteristics have on the integrity of the road surface. Practical engineers realized in a vague way that soils varied considerably; some were plastic and swelled and shrank considerably with variations in moisture content; others were granular and did not retain water and offered good support. Then there was a broad band of soils of intermediate characteristics whose field behavior was not well defined and whose identity was uncertain as no means were at hand to describe them properly.

The researches were directed toward the establishment of laboratory tests for identifying and classifying soils in terms of their characteristics which were considered significant from the road builders' standpoint—characteristics such as their water holding value, their volume change due to moisture, their bearing value and other properties. As a result of these studies, it is now possible to make laboratory soil tests by which an engineer in one part of the country can tell what kind of material he has to deal with in terms of the experience other engineers have had with soils elsewhere having similar characteristics. This is a distinct advance over our knowledge of five years ago. We are now much better enabled to vary our road designs in accordance with one of the variables, the soil, which controls the design.

#### **Blanket Course Under Pavements**

Numerous other studies have been made on the subgrade particularly looking toward the necessary steps which must be taken in road design where poor subgrades are encountered. One interesting development as a result of these investigations is that of the use of a blanket course of fine granular material under road surfacings when laid over a plastic subgrade material. Such a course which may be composed of cinders, bank-run sand or gravel, slag or stone screenings of 4 to 9 inches in thickness is effective particularly under

the macadam type of base or road for it serves as a "shut off" layer in preventing the working of the clay subgrade up through the voids in the stone. The road is thereby greatly strengthened for the wet plastic clay which lubricates the stone is replaced by stable, granular material which greatly stabilizes the foundation layer. Other beneficial effects are also produced by such a layer which will require detailed treatment elsewhere.

The importance of this development can not be over emphasized for unquestionably it has made the flexible type of surfacing or base much more capable of supporting heavy loads, and this has been accomplished without undue added expense. A similar use of this so-called "blanket layer" under concrete pavements has also proven to be of decided value in several instances especially where the subgrade material changes in volume considerably when it dries out or under severe freezing conditions. The benefit under concrete roads should not be accepted as being universal as yet, but certainly a trial of such construction will merit the attention of all engineers who should give it a thorough test wherever they are encountering trouble with excessive vertical movement with resulting undue cracking and high maintenance expense.

#### **Drainage Experiments**

Undoubtedly, water in the subgrade is the most detrimental single factor affecting the life of any road surface. First, because it greatly reduces the load supporting value of the soil; second, because the effects of freezing and thawing are greatly increased; and third, because of the high vertical shrinkage which results when that moisture disappears due to continued evaporation in hot weather. Studies of moisture in the subgrade and its control are therefore highly important for they mean much in the cost of road building. When are tile drains effective or not effective? How high should the subgrade be raised above the level of the surrounding country? The answers to these two questions alone mean millions of dollars to any state highway department in the country. Partial and tentative answers at least have already been obtained.

#### **Concrete Road Design**

By far the greatest amount of recent research has been devoted to the



design of concrete highways. The reason for this is no doubt attributable to the fact that this type has been more largely used than any of the other surfacings and therefore it was considered more important to devote more study to its economical production. Then, too, concrete because of its more or less elastic behavior was more susceptible of analysis according to the known laws of mechanics than the plastic or non-rigid types of surfacings. Engineers, therefore, applied research methods to concrete with more hope of immediate solution than with other materials. However, other surfacings have been and are now also being investigated by research methods.

Roads extend for mile after mile and in a single state more than a thousand miles of concrete roads might be built in a single year. If the design is too thin for the traffic which is permissible under the law, rapid failure might result and the life of the road would be greatly shortened, high maintenance expense would result and much high cost replacement would have to be made within a few years. This saving in initial cost would surely be highly uneconomical. On the other hand, it is undesirable to greatly over-build in thickness for a single inch of concrete too much means millions of dollars in a one year's construction in a single state program. Again it is uneconomical to use a design in which the material is not properly distributed so that the road will be equally resistant to loads no matter where they might be imposed.

So, much research has been devoted to determine the proper design of concrete pavements suitable for given loads. This research has taken the form of service tests conducted on test roads especially built for that purpose and by means of stress measurements taken on actual pavements and on test slabs subjected to loads simulating traffic. The United States Bureau of Public Roads, the Illinois, the California and the Pennsylvania Highway departments have led in these investigations and the details of the results have been reported in the publications of the Bureau of Public Roads, by the National Research Council, the American Association of State Highway Officials and in the technical press. These investigations fortunately all lead to the same general result, namely, that our old ideas of building a concrete pavement with

thin edges and a thick center were in error and that rather these thicknesses should be reversed. At the present time as a result of these investigations approximately two-thirds of the state highway departments have abandoned the thin edged design in favor of a more rational design having thicker edges than formerly used. The economies effected by these researches mount up into the millions of dollars and during the period of future intensive road building the savings will be tremendous. Moreover, there will be less maintenance expense. It might be thought that economies in design such as have been thus brought about by research are to the detriment of the thousands of producers of materials used in road construction. Such, however, is not the case for it is questionable if more funds would have been made available for road building than have been, and in all probability without the greater confidence in our road designs that have resulted from research our legislatures would not have been quite so willing to vote such large sums for that purpose. Research which has resulted in economies has helped everyone as it does invariably.

#### Materials

Road materials have likewise had their share of investigation through a number of different agencies. Thus the Bureau of Public Roads has made a comprehensive study of the relative wear resisting properties of concrete containing coarse aggregates varying from the softest to the hardest and involving gravel, slag, stone and burnt clay. The effect of the fine aggregate on wear was likewise studied. These tests which were made solely to study the question of abrasive resistance have developed many interesting facts with regard to the part the coarse aggregate and fine aggregate play in the wearing qualities of the road and have placed our information in that respect on a much more definite basis than heretofore and the limitations of the wear resisting properties of the various aggregates are more fairly established. The element of wear is not so important as a controlling factor in the life of a concrete road as the structural strength of the concrete and this fact must be given proper weight in interpreting any set of wear tests. In general, the life of concrete roads is not controlled by wear although the maintenance expense will undoubtedly be so influenced and to

this extent wear tests have importance. The significance of these tests has been primarily to permit of establishing a limit of hardness of stone below which the stone is considered too soft because it then wears faster than the mortar. This limit seems to be set at 7 per cent of wear as determined in the standard Deval abrasion test. Undoubtedly, however, there are other facts which should be established before this figure should be taken as final for we know little about the effect of character of aggregate or resistance to repeated stress or to alternate freezing and thawing.

The soundness test for coarse aggregate of all kinds has lately been given considerable attention for it is found that the coarse aggregate can cause failure of the concrete unless it is sound and, then, too, the presence of soft or unsound particles leads to unsatisfactory appearing road surfaces. This test consists essentially of promoting the growth of crystals of sodium sulphate in the pores of the aggregate by alternately immersing it in a sodium sulphate solution and allowing it to dry. A weak, unsound aggregate is disrupted by this treatment which stimulates frost action. Tests such as the above serve to give us more definite facts with regard to materials and permit them to be used within their proper limitations. Intensive studies are also being conducted on Portland cement and on bituminous mixtures both with the idea of placing these products on the highest plane of usefulness for their respective purposes. Such research cannot help establishing greater confidence in the finished structure and the benefits in the form of economic savings are simply inestimable.

These examples are cited merely as typical of the vast amount of research which is being carried on in the field of highway construction. No mention has been made of the researches in traffic distribution which are so vital to the proper planning of a highway system and through which vast economies are affected by better suiting the system to the actual needs. Again no mention has been made of the numerous detail problems which are being worked on not only in the field of materials but in motor vehicle production, cost of operation, in the field of bridge structures, safety and standardization of markings. All of these researches are important and

are paying returns in a ratio much out of proportion to the expenditure made for the necessary research.

### New Incorporations

Sand Hill Sand Company, Star, N. C. Capital \$50,000 and \$3,000 subscribed by T. J. Ellis and J. S. Chris-holm of Star, and N. J. Carter of Eagle Springs, N. C.

Penn-Tex Oil and Potash Company. Capital \$100,000. Texas agent, Ike D. White, Austin, Texas.

Progressive Sand and Gravel Co., Fairlawn, N. J. Capital \$125,000. Incorporators: Herman T. Backhus, Fred C. Backhus, Woodridge, N. J., and Fred E. Hartmann, Haledon, N. J. Helderberg Cement Company, Inc., Albany, N. Y. Capital \$1,000. Directors: John A. McNaughton, Norborne P. Gatling, Jr., and Alexander T. Douglas, all of 52 William street, New York City.

Best Concrete and Cement Company, Cleveland, Ohio. Capital \$5,000. Incorporators: Louis M. Levin, Marian and Pauline Shapiro, Ben Smith and Max Shapiro.

The Superior Gravel & Sand Co., Superior, Nebr. Increasing capital from \$10,000 to \$25,000.

Industrial Sand and Gravel Corporation, Norfolk, Va. Capital \$5,000 to \$50,000. Dealers in sand, gravel, clay and their products. Incorporators: Joseph H. Baker, C. N. Bailey and A. D. Overmyer, all of Norfolk, Virginia.

General Material Company, Wilmington, Del. Capital \$600,000. Mine stone, rock and sand. T. L. Croteau, incorporator.

Hunt-Drury Gravel Corp., Mineola, N. Y. Cement blocks. 250 shares \$100 each; 2,500 common, no par; R. T. Childs, W. S. Smith, incorporators.

Portage Concrete Products and Gravel Co., South Bend, Ind. Capital \$30,000. Incorporators: Alex and Normal Belkin and Abraham Minkin.

Albert L. Vandiviere, Eden Hot Springs, Calif. Capital \$71,100, erection of mills for crushing stone and making cement products, and for constructing buildings, etc.

Bentolini Traprock Co., Trumbull, Connecticut. Capital \$200,000. Dealers in sand, gravel and stone.

Belvidere Hydraulic Stone Company, Wilmington, Del. Capital \$75,000. Dealers in building sand, cement and building materials of all kinds. Incorporators: M. L. Rogers, L. A. Irwin, William G. Singer.

## Trends in the Concrete Products Industry

**E**STIMATES compiled for 1925 indicate not less than 600,000,000 concrete blocks will be used to build structures of all types in this country. Concrete brick sales also show a large increase, this year's production reaching a total of some 300,000,000 brick. Other concrete products such as concrete sewer pipe, lamp posts, garden furniture, silo staves, culverts, and tile show corresponding increases in adoption, according to A. J. R. Curtis of the Portland Cement Association.

"Since the war," Mr. Curtis says, "production of all concrete units has increased many hundred per cent. Concrete block has increased its sales from 50 million units in 1920 to 468 million units in 1924. In 1924 the American public spent more than \$85,000,000 for concrete block and it is estimated that more than \$100,000,000 will be spent for concrete block in 1925. Not many years ago, rural construction where the user made his own block in home-made molds pretty nearly circumscribed the field of usage. Today there are millions of dollars of capital invested in high type manufacturing plants and production and sales have been put on an equal basis with other large modern industries.

"Not only houses and barns, but schools, industrial plants, store buildings, office buildings, churches and many other types of structures are being built of concrete masonry. New uses are coming thick and fast, so

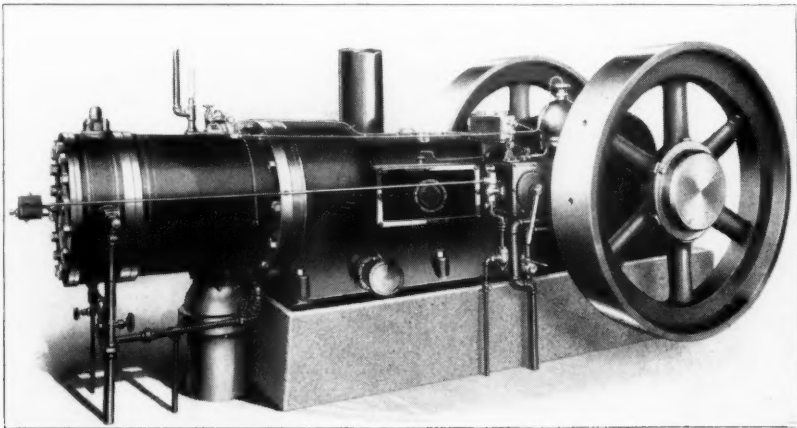
fast, indeed, that the industry is hard put to keep pace with the demand during the construction season.

"A survey recently concluded shows that concrete products manufacturers are today making many new and specialized types of units. Partition tile and block, floor tile, roofing tile, floor slabs and beams, posts, conduits and many other special products are being manufactured to meet the requirements of users.

"Machinery has replaced hand labor and special machines designed to insure uniformity are in general use. Plants representing hundreds of thousands of dollars worth of machinery and property are replacing the one man shops of a generation ago.

"There has been a noticeable trend of late toward a widespread revision of local building codes to give concrete products an equal standing with older materials. The Underwriters Laboratories have given concrete block a 2-hour fire rating. Concrete block have brought the hollow air space type of wall into great favor as the best wall for home building.

"Building materials figures show that usage of concrete building block and tile has, within the last five years, increased from about 0.48 block per capita to above 5.44 block per capita. To supply this tremendous demand some plants have been forced to work day and night during 1925. Several more plants climbed into the million block per year production class.



The Primm SS Type Oil Engine. One of the Two New Models of Primm Oil Engines Developed by the Power Manufacturing Company

## Plymouth Solves Haulage P



*Plymouth 8-ton Locomotive at Quarry of Pacific Rock Co., San Fernando, California*

Plymouth Gasoline Locomotives are made in 3 to 20 ton sizes and are available in 30 to 48 inch track gauge to meet every condition.

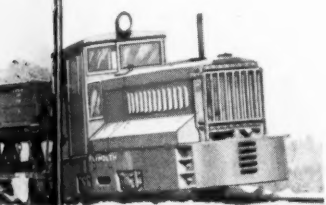
Write for Catalog and Performance Bulletins "C" and "D".

The Fate-Root-Heath Co. (Plymouth Locomotive Works), Plymouth, Michigan

# PLYMOUTH

## Gasoline Locomotives

age Problem



PACIFIC ROCK COMPANY

San Fernando, Calif., June 3, 1925.

The Fate-Root-Heath Co.,  
Plymouth, Ohio.

Gentlemen:

We have been using one of your 8-ton 36-in. gauge Plymouth Gasoline Locomotives for over eight months, continually hauling material from our deposit to the crushing plant and we are very pleased with its performance.

During this period we have practically operated this machine without any repairs outside of brake-shoes.

We highly recommend this to anyone having hauling problems. If at any time we would be in want of more motor power we will surely buy Plymouths.

Yours very truly,

(Signed) R. T. BUSH,  
Vice-Pres. and Gen. Mgr.

EVERY day sees a larger number of users of Plymouth Gasoline Locomotives in the stone, sand and gravel industries.

Plymouths are rapidly displacing the horse, mule and steam dinky—speeding up production and cutting haulage costs.

No matter what the enterprise or industry, if haulage is a problem the Plymouth will save you money.

Co., San Fernando, Calif.  
to 20 ton sizes, and in any  
and  
Works), Plymouth, Ohio

**PLYMOUTH**  
*Locomotives*

## The Sand and Gravel Industry for 1926

**T. R. Barrows says:**

"The inseparable twins in the industrial life of the United States are prosperity and construction. You never see the one without the other and our business history teaches us that the two are interdependent, and that each contributes to the welfare of the other in equal measure.

"A survey of the output of plants owned by members of the National Sand and Gravel Association indicates that approximately 50 per cent of the yearly tonnage goes into the construction of roads. The remaining 50 per cent is put to many and diverse uses, chief among which are structural building and railroad ballast. Many of our members market the so-called higher grades of sand which are used in the manufacture of glass, molding sand, sand blast sand, and for other purposes. It may be assumed, though, that the three principal consumers of sand and gravel are road construction, structural building, and railroad ballast.

"As to the road building program of 1926, it seems reasonable to anticipate that it will equal at least the volume undertaken in 1925. The saturation point in the construction of improved roads is far distant, for we have not more than begun to build adequate highways. The time will come when there will be a connected system of arterial highways which will permit unobstructed highway transportation between all cities of 5,000 population or larger, over improved roads which have been mapped out by the U. S. Bureau of Public Roads and the various state highway departments.

"The policy of Federal aid in the construction of interstate highways will be continued, despite the efforts of some agencies to bring about its curtailment, even its entire elimination. Supported, then, by a sizable Federal aid appropriation, it is apparent that the states will carry on a satisfactory road program during the coming year, and that county and municipal authorities will supplement this general program with road construction to keep pace with the states. It would seem, therefore, that the demand for sand and gravel for road construction in 1926 will be entirely satisfactory.

"As to the structural building

market, it is not easy to foretell the demand during 1926. It is entirely possible that the demand will not be as great as it was this year, and it is well to anticipate that there will be a falling off in building. But so long as this country is going through a prosperous era, there will be an active demand for construction, no matter what figures are produced to show that the supply has passed the demand. The tax reduction legislation soon to be passed by Congress will prove a boon to business in general next year, and money now tied up to avoid heavy taxation will be invested in more fruitful fields. The inevitable result of this situation will be a demand for building improvements and a consequent demand for sand and gravel.

"As to gravel for railroad ballast, I venture to assert that 1926 will witness the largest market that our members have ever had. At the appropriate time, the National Sand and Gravel Association will make public the outstanding results of the invaluable work which its Washed Gravel Ballast Committee has done this year. To Mr. Earl Zimmerman, the chairman of this committee, and the other members who have labored so faithfully to realize its goal, the entire sand and gravel industry owes a vote of thanks for the things which have been accomplished in bringing to the attention of the railroads the advantages of washed gravel ballast. The work of this committee will be reflected in a greater demand for gravel for ballast, and this greater demand will appear in 1926.

"Taking all factors into consideration, I feel that the established sand and gravel industry will have a satisfactory business year in 1926 and that, barring unforeseen circumstances, it will compare favorably with 1925 and 1924."

T. R. Barrows,  
Sec. National Sand & Gravel Ass'n

**T. E. McGrath says:**

"We look toward the first part of the new year with confidence and base that confidence on the municipal, industrial and limited amount of state work which is being carried over from this year account of the unusually cold and rainy weather which prevailed during the months of October

and November, and also on the fact that there is considerable new work that will develop as the new season progresses.

"Up to this time the Supreme Court of Illinois has not handed down a decision with reference to awarding the state road contracts under the one hundred million dollar bond issue. While the officials of the Division of Highways are optimistic and assure the contractors and the building material producers that the state will build a thousand to fifteen hundred miles of concrete highways during the year of 1926, still, the pending decision of the Supreme Court will determine whether or not any roads under the one hundred million dollar bond issue will be built. If the court holds that the law provides for the completion of all highways laid out under the sixty million dollar bond issue before the roads designated under the one hundred million dollar bond issue can be started, the sand, gravel and stone interests in Illinois can look for very little tonnage to move on state concrete road work next year, as all the roads provided for under the sixty million dollar bond issue are under construction or have been completed except about two hundred miles.

"The building industry at this time is more or less normal. There is a slight tendency toward an advance in the price of building materials, which is a good sign, and we feel safe in predicting that there will be a fair demand for sand and gravel next year in Illinois. If the state is permitted to go ahead with its concrete highway building program under the one hundred million dollar bond issue the demand for material will be somewhat above normal beginning about June 1st.

"The sand and gravel producers serving Illinois prepared this year to serve a twelve to fifteen hundred mile concrete highway building program and less than five hundred miles were awarded. This situation created a serious over-production which led to the natural result of unstabilizing the market. The sand and gravel market throughout the entire state of Illinois has suffered more during the year of 1925 on account of over-production—or it may be said from a lack of an anticipated demand—than in any previous year.

"Some day perhaps the business world will learn that nothing that is

really constructive or worth while can be obtained through unstabilized marketing conditions of any important commodity—which condition always results when the production goes beyond the demand. In this respect we hope that 1926 will show a marked improvement in the conditions that prevailed throughout the year of 1925 in the sand and gravel industry."

T. E. McGrath,

McGrath Sand & Gravel Co., Inc.

#### F. W. Renwick says:

"All conditions indicate that 1926 may be the best or the worst year in the history of the industry, just according to the attitude of the railroads. Unfortunately the railroads do not seem to realize that building materials are the biggest source of revenue they have outside of bituminous coal. They are continually crying for an advance in rates regardless of the fact that they are pulling down more in freight than the producer gets for his material when loaded on cars. They will tell you this is necessary in order to meet the competition of truck hauling without having sense enough to realize that every increase in rates on railroad haulage increases the haul possible for trucks at a profit. Building materials are paying an increase of 100 per cent on freight rates over those existing in 1918, and have gotten beyond the saturation point on a selling price at a profit. The past year's record of 65,000 cars per week of sand, gravel and crushed stone throughout the country is an indication of the possibilities of the industry if encouraged instead of being killed by exorbitant rates.

"1926 presents wonderful prospects in our business provided we are not handicapped by most unnatural causes."

F. W. Renwick,

Pres., Chicago Gravel Company

#### E. E. Kloss says:

"Our chief interest is centered in the steel foundries making railroad equipment castings as these consume the largest percentage of our tonnage, and our estimate of the probable conditions in 1926 is based on the prospects of this industry.

"Railroad car buying has been a sore disappointment in 1925, as it was the smallest year for some time in spite of the record-breaking car loadings. All indications point to a continuation of large car loadings as

the purchasing power of the country has not been curtailed in any way. Crops have been abundant and in the main profitable, giving the farmer a large measure of purchasing power, and the general public through the lack of unemployment during the past year will continue to keep money in circulation.

"The continued use of railroad cars in a strenuous campaign of delivering goods will entail heavy replacements which cannot be deferred for any great length of time, and we therefore look for a wave of prosperity to hit the steel foundries in which we are interested."

E. E. Kloos,  
Gen. Mgr., The Portage Silica Co.

**O. A. Nix says:**

"The conditions at the present time in this section are faithfully described in that letter of one year ago, there being but slight changes in the basic conditions of the industry now as compared with a twelve-month period gone by. Pit prices for materials based on a suppositious production costs seem to be the rule among producers; the largest producer in our immediate territory voluntarily states that he made net in 1924 less than \$1,000 on a tonnage of approximately 1,800 to 2,000 cars. This condition led this company to withdraw largely from the market the past 18 months, and, as a result, our production has dropped 50 per cent or more, necessarily entailing operation at a loss. No more so, however, than if we had attempted to operate at the prices obtainable.

"We believe 1926 will be a better year than 1925; construction, it now seems, will be fully as active as to general building construction, many very large building projects now being under consideration for the new year, and highway work will be more active provided the next Congress does not throw a damper upon Federal aid, as is predicted from some sources. All in all, we look for a fairly active year at somewhat better prices."

O. A. Nix,  
J. R. Hime Sand Company.

**J. E. Carroll says:**

"We feel decidedly 'bullish' on the sand and gravel situation for the coming season of 1926. In Western New York and North Western Pennsylvania a great many highway projects are being considered and will be put through the coming season.

"It is our opinion that the building

program has almost reached the point of saturation. We do not, however, base the sale of our products to the building situation alone. One small concrete highway will absorb more sand and gravel than a thousand small homes.

"Our production for 1925 increased over the preceding year 37 per cent. We would easily have reached an increased output of 50 per cent had it not been for the extraordinary wet season that began in this territory about the middle of September.

"The demand for our products has increased every year. While we have not produced any ballast material for railroads, we find from inquiries that there is a tendency to use more gravel ballast on railroads than there has been used in the past. This being the case, we confidently look for an increased production in our different plants for the season of 1926 over 100 per cent.

"The price situation has been unusually strong the past season. We maintained a standard price throughout the season. On account of the number of new and small plants that are springing up in the different sections of our territory, we look for a slight decrease in the prices for 1926."

J. E. Carroll,  
J. E. Carroll Sand Company.

**Hugh Haddow, Jr., says:**

"We are just completing a very successful year which I believe to be the condition of our whole industry. As I see it, the outlook for general business is even better today than it was at this time last year.

"Specifically there should be a continuance of highway work throughout most of the country. Some few sections may seem to have a large percentage of hard surfaced roads already constructed, but it would seem as if the continuance of road programs is necessary to supply the demands of the people.

"Housing problems are probably not so acute as they were a year or two ago, but the continuation of new building seems to me to be pretty well assured.

"In the other industries that we deal with, particularly the steel and iron industries, we look forward to a continuation of the present demands. All in all it would seem as if there is every reason to expect a continuance of the present good times."

Hugh Haddow, Jr.,  
Menantico Sand & Gravel Company.



# Hydraulic Dredging and Hydraulicking Step Ahead in 1925

By G. B. Massey

**H**YDRAULIC dredging has increased in use of late years and especially during the last year. The principal reasons for this are, the tremendous amount of channel digging and land making in Florida and the increased use of the heavy oil engine for power, thus making it possible to do work at a less cost and increase its use because of a more attractive cost of work.

The Florida work has attracted to it all available existing hydraulic dredges and has occasioned the building of scores of others. As a rule the work is handled by dredges which were available and, in many cases, not at all suited for the work. Steam machines are in use and other machines are too small with consequently high operating costs. As it comes to be realized how the equipment used affects the cost of the work, it is probable that works of even greater magnitude will be undertaken on the strength of the lowest obtainable operating costs due to adequate size and suitable design of equipment.

In a hydraulic dredge, more than in any other class of equipment, the power used varies with different sizes of machines. The labor charge varies inversely as the quantity of work done. A small dredge will have an abnormally high labor charge and a large high-powered dredge a very low

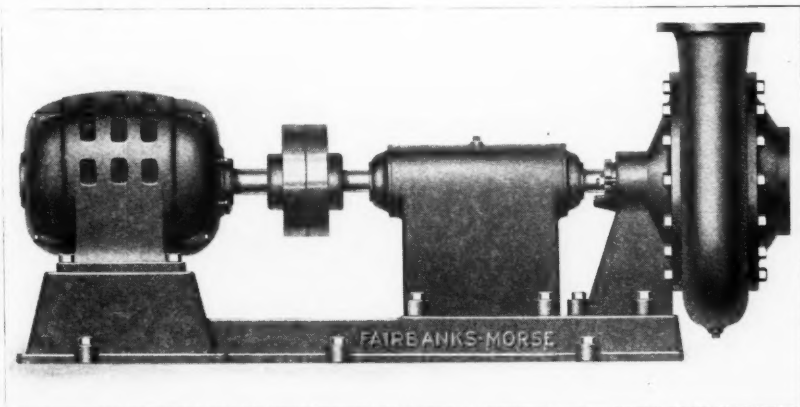
labor charge per cubic yard handled.

All of the material has to be pumped through pipes, and the relation between the small dredge and the large one can be seen easily when we see the loss of head per one hundred feet of pipe for a velocity of flow of ten feet per second in the pipe, assuming clear water only is being pumped. The relation would be about the same with a mixture of water and solids.

Pipe Diam.	Head loss		Head loss volume
	Per 100 foot	Relative volume pumped	
8"	4.6	1.00	15.0
10"	3.7	1.56	7.8
12"	3.1	2.25	4.5
15"	2.5	3.52	2.3
20"	1.9	6.25	1.0

The last column reflects the relations between the different sizes of dredges as to power used per unit of material pumped. It can be seen that it requires more than six 8-inch dredges to handle the same volume as one 20-inch machine, and that the power required in the case of the 8-inch dredges would be fifteen times the power required in the one 20-inch dredge.

Then the efficiency of the large equipment is better than that of the small equipment. To be sure, this difference is not very large in the case of heavy oil engines or electric



The Fairbanks Morse Wood Trash Pump, Horizontal Type, Equipped with Ball Bearings

motors, but in steam equipment, it is a very material factor. So the tendency has been and will continue to be toward using larger dredges on large operations.

The second influence on the hydraulic dredges has been the heavy oil engine.

The principal advantage of its use is its astounding economy of operation as compared with the steam plant. The second is the ease with which the fuel is handled and stored and the low loss in fuel due to handling. Thus the dredge has a freedom of movement which is even better than the steam dredge and a freedom from fuel delays and worries closely approximating an electric dredge.

The electric dredge has, and probably always will have, the advantage that a commercial pump can be direct connected to the motor shaft. The steam engine revolutions are too low for this and reduction gears, silent chain or belting have to be employed or else a very large specially built pump installed. The same is true of heavy oil engines but their speed is much higher than the steam engine and so the ratio of speed change is not so great as with the steam engine.

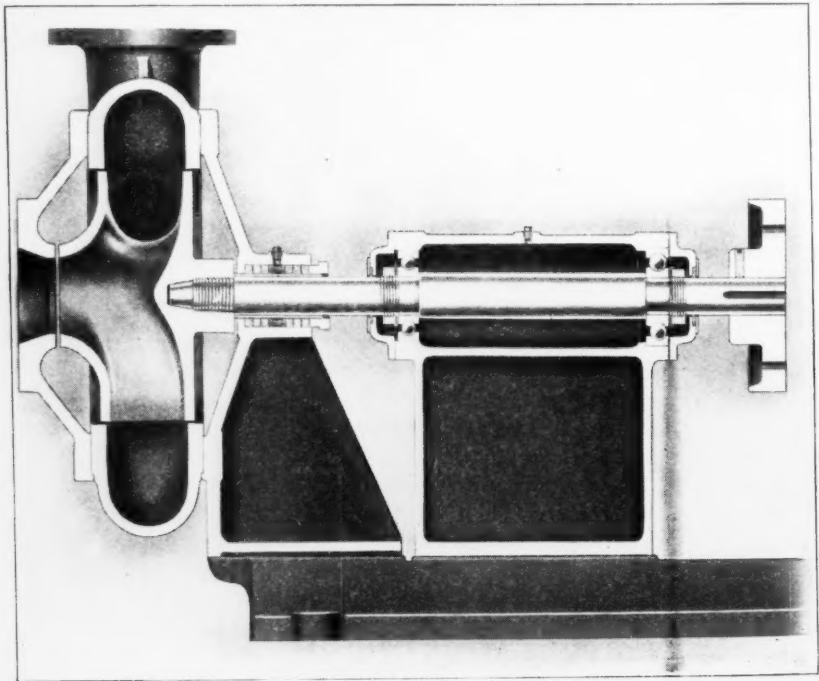
If a special size of pump is used it does not need to be so large as with the steam engine.

Another tendency is to equip dredges with a suitable winch and an adequate cutter, cutter shaft and ladder. A strong winch and a weak cutter equipment will rack the latter to pieces. A good cutter equipment is of no value with a poor winch which cannot pull the cutter head into the bank as fast as the cutter is capable of working.

Few realize how important it is to insure the most favorable possible conditions at the suction mouth. It is here that the output of the dredge is established regardless of the velocity and carrying capacity of the stream in the discharge pipe.

It is in the discharge pipe that most of the power is absorbed, but it is at the suction mouth where the proper proportioning of size of suction mouth, type of cutter blades, speed of revolution of cutter head and swinging line pull, depth and width of cut has to be done.

During the year, a new centrifugal pump has become available for dredging purposes, or rather it has come into commercial use, as it had previ-



A Cross-Sectional View of the Horizontal Type Pump

ously been developed to meet special uses. The peculiarities of the pump are that it has only two blades and that the entering or leading edge of the blades is semi-circular in form instead of being narrowed down to a sharp edge. This adds to the life of the runner, which is enclosed, and enables it to maintain its efficiency longer for that reason.

Another advantage of the two blades is that the openings through the runner are as large or larger than the suction or discharge pipe so that all solids which enter the suction are passed through the pump without delay or injury to the pump.

This pump was developed by Mr. Wood in New Orleans and was perfected for dredging while being operated on the New Orleans Industrial canal. The various commercial sizes are now being put on the market by Fairbanks Morse & Company who have acquired the patents.

The efficiency of the pump is very good. The speed is somewhat higher than other pumps, as the runner diameters are less. It is being built, for dredging purposes, of abrasion-resisting metal.

There are various arrangements of drive which are being tried out on dredges driven by heavy oil engines. These are listed below in the order of their first cost, the most expensive first:

A. The engine drives a generator and the pump is motor driven. An auxiliary engine drives a generator which supplies current for the auxiliaries, such as cutter head, winch, service pump, priming pump, etc.

B. The engine drives the pump

direct and an auxiliary engine supplies current for the auxiliary equipment.

C. The engine drives the pump direct and also drives, by means of a silent chain drive, a generator which supplies current for the auxiliaries.

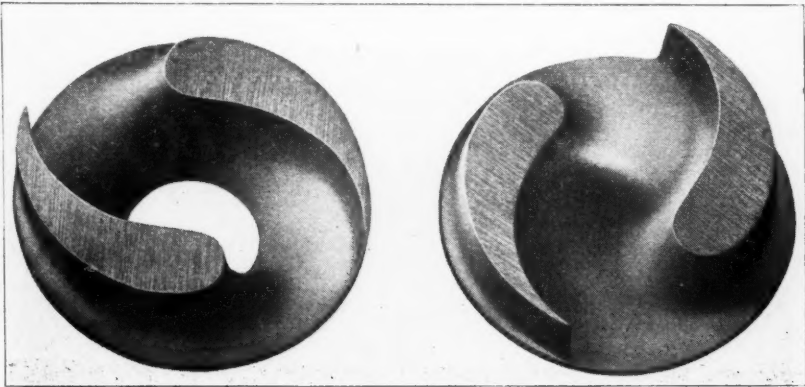
D. The engine drives the pump, by means of a reduction geared unit, and a generator for auxiliaries by silent chain drive.

E. The engine drives the pump by a belt or rope drive and also drives a generator for the auxiliaries.

F. The engine drives the pump, the winch and the cutter head by rope drive.

Hydraulicking has not increased in use in the United States during the year, but in other countries it has been very effectively employed at a great saving in cost and accomplishing what could not be effected in any other manner. Hydraulicking suffers in comparison with other methods because there are so few champions of it abroad as compared with the salesmen for shovels, draglines, dredges and similar machines. A plant for hydraulicking is purchased directly from the builders—the pressure pumps and direct-connected motors from one, the dredging pump and motor from another, and the pipe and fittings from a third, as there is no one builder who supplies all of the equipment and consequently it does not pay any one of them to go out after the business.

The second reason for the lack of popularity of hydraulicking is the previous lack of contact with it. Most quarry and sand pit operators are familiar with shovels, draglines and dredges, know how they operate and



At the Left Is Shown the Enclosed Impeller. At the Right Is Shown the Same Impeller Cut Through the Center Line and Opened Out

just what can be accomplished with them. Most of the owners and operators of properties have never seen a hydraulic plant at work and have no idea of the advantages, the limitations and the costs. Most of them know good shovel men or dragline men but very few of them know of any good nozzle man. As a matter of fact, millions of cubic yards have been and are being moved every year by the hydraulic method but not in pit and quarry work as such.

The principal use of it in the United States is in the pebble phosphate fields of Florida and abroad in the tin mines of the Malay Peninsula. There is, of course, a constant improvement in centrifugal pumps with better efficiencies being very important where such large quantities of water are to be pumped. Better dredging pipe is now available in sizes from twelve inches in diameter up to the largest sizes used. Smaller sizes than twelve inches in diameter cannot be used to advantage, except in the very thin gauges. It is quite probable that another year will see an awakened interest in this very useful work in which water can be made to perform in the service of man.

### Climax Issues New Catalog

The Climax Engineering Company of Clinton, Iowa, has just issued five new bulletins for its loose leaf catalog. They go into the mechanical features of the product thoroughly and give full specifications of each model of engine.

Bulletin "A" describes the "K" series, four cylinder, 5x6½ inch engine. Bulletin "B" covers the "T" series, four cylinder, 5½x7 inch engine. Bulletin "C" describes the "R" series engine, which is made in two models—Model "R4U" covering the four cylinder, 6x7 inch engine, and Model "R6U" covering the six cylinder, 6x7 inch engine. These series of engines develop power ranging from 35 H.P. to 130 H.P.

Bulletin "D" covers the "K" and "T" series portable power houses, which are designed for operating hoists, portable saw mills, power pumps, generator power, etc.—in fact, practically all places where industrial gasoline engines of 44 to 75 H.P. may be used.

A feature of these bulletins is the list of equipment, each carrying its

code word so that interested parties may easily obtain prices.

### The Eagle Washer

The washing and cleaning of sand and gravel is not a new step in the industry. In visiting a great many plants and talking with the operators it is noticeable that almost every one has decided views as to how this should be done, and many have built their own washing equipment. Also, as the cleaner and more readily accessible deposits are worked out and as markets become larger, operators are forced to clean their material in order to pass specifications, which are also becoming more rigid. To hand pick material is a impossible. For that reason mechanical methods have been introduced

About two years ago a gravel man of the Eagle Iron Works' acquaintance came to them with a rough idea that he desired carried out. They took this idea and, with several decided changes and improvements, built him a washer. The results obtained with this washer were so satisfactory that the Eagle Iron Works decided to market the Eagle Gravel Washer.

This washer takes advantage of the tendency of lighter materials to float. Thus, the water entering the bottom of the tub flows up through the material as it is conveyed up the tub by means of a screw. This also agitates and scrubs the material, causing the foreign matter to be floated off over the lower end with the dirty discharge water. The clean gravel is discharged from the upper end. With this principle the dirty gravel is always moving against a clean stream of water.

These washers have also proven efficient in removing mud balls. Upon the screw at intervals are placed agitators which constantly stir and agitate the material as it is conveyed up the tub, thus causing a grinding action which grinds up the mud balls while the clean stream of water, which is flowing up through the material, carries away the ground-up mud and silt.

Particles of coal are successfully removed from the gravel. The combination of the agitators and the amount of water used may be regulated so as to remove foreign matter of practically the same weight as the gravel itself.

## What's Ahead in the Gypsum Industry

The U. S. Gypsum Company says:

"The future of the building industry belongs to the non-metallic minerals. Consider the basis sources of wealth upon which the economic structure of the country has been founded in past. First came the surface-crops of the soil; land-ownership, agriculture, lumber, furs, meat-crops and such. The pioneer made his living from these surface-crops, and the first great American fortunes were accumulated through them. In the beginning the accumulation of wealth from surface-crops was entirely through agriculture, but even before the revolution the colonists had learned to use them commercially. Thus, timber was not consumed only for immediate purposes as in house-building; some of it was devoted to ship-building, and so the foundation of shipping fortunes was laid. Another striking instance is the exploitation of furs; this surface-crop was responsible for the beginning of the Astor fortune.

"Three great economic trends had their beginning in the United States during the last century. These were the development of coal, of steel and of petroleum. These basic sources of wealth were opened up, one after another, and immediately became the bases of immense fortunes, as everyone knows. Upon their development depended every other contribution which the nineteenth century made to American economic history. That is, railroads, automotive transportation, the skyscraper and the tremendous development of hydro-electric energy followed the successive opening up of coal, steel and petroleum.

This illustrates the cycle by which the industrialist follows the farmer and, giving only secondary thought to the surface-crops of the soil, goes down beneath the surface of the earth to tap its deeper resources. Construction has followed this general economic trend. The wood house of the seventeenth century made way for the brick and stone house of the eighteenth. One of the interesting developments of architecture during the early part of the nineteenth century was the use of 'cast-iron fronts' on commercial and other buildings; and late in the same century came the first skyscraper, the building built, primarily, of steel.

And now, with the coming of the twentieth century and the more intensive development of the country's resources, we are getting into the age of the non-metallic minerals. Transportation is a factor in this. Because of the modern development of industry which makes possible a national production-system coupled with a system of national distribution, it is possible to utilize the non-metallic minerals which formerly were ignored by the agriculturist and the industrialist. Another factor in the equation is the development of new uses for the old materials. Lumber, for instance, does not need to seek a market; the uses of it increase in number so rapidly that, from the lumber producer's point of view, it sometimes is more profitable to sell the material in special form for some use in which there is no substitute for lumber.

"So far as building is concerned, each of these successive materials has made a place for itself because it has supplied everything that the previous system of construction supplied and some other advantages besides. Steel, for instance, provided the structural strength of wood and stone and, in addition, the other qualities which made possible greater height than either wood or stone did.

"In the same way the non-metallic minerals in general, and gypsum in particular, offer the builder more qualities than previous materials have afforded. Steel is not fire-resistant to any great extent; gypsum is. Steel is a fairly ready conductor of heat; gypsum is an insulator. Again, the non-metallic minerals are less expensive than most of these other materials. And they are highly adaptable. The number of forms in which they can be applied and the purposes for which they can be employed already are large and are increasing constantly.

"For these reasons and others, it may be taken as a basic principle the future of the building industry belongs to the non-metallic minerals. Gypsum, crushed stone, sand and gravel, clay-products, terra cotta, lime, asbestos and portland cement are playing a constantly increasing part in the evolution of construction in the United States. And, with new forms of the material being offered to the building public and with

a rapidly extending acceptance of these forms of construction being manifested by the building trades, the coming year should witness an acceleration of this tendency.

"We anticipate that 1926 will be a period of due expansion for the industry."

The U. S. Gypsum Company.

**Frank A. Wilder says:**

"For over a year there has been a feeling in many quarters that the peak in building construction had been reached. Each month, however, has seen the total of building permits run higher than for the corresponding month last year, and the later months of 1925 are no exception to this statement. This means that the outlook for the gypsum industry for at least the first half of 1926 is very bright indeed.

"With continued prosperity throughout the country, it will probably be necessary to revise our ideas in regard to the time when the peak in building construction will be reached. It will probably not come in 1926. The demand for small homes and apartments than can be rented for a moderate figure has not yet been satisfied. With money conditions easy, the amount of building material that can be consumed in replacements has probably been under-estimated. Cheap, flimsy fire-traps are being torn down to give room for more substantial structures.

"The outlook for the portland cement industry in 1926 is good, and this means that the gypsum industry will to some extent share in the prosperity of the cement manufacturers, since gypsum is an essential ingredient in that product.

During 1926 the use of calcined gypsum with an aggregate for poured-in-place walls for bungalows, garages, and other structures where the load placed on the walls is not great, should increase considerably. This type of construction means that from 20 to 30 tons of calcined gypsum are used in an ordinary bungalow, where only three or four tons would be used if calcined gypsum were applied only to the interior walls."

Frank Wilder.

**Joseph Reeback says:**

"We think there will be a considerable quantity of building for next

year, and we look forward to continued good business during 1926."

Joseph Reeback,  
The Higginson Manufacturing Co.

**H. C. Hamilton says:**

"From what we can judge of future conditions, we have a very good year ahead of us, which we believe will exceed the one which is about to close."

H. C. Hamilton,  
The Michigan Gypsum Company.

### Cement Lime Mortars

An increase in workability and possible reduction in cost are the principal reasons why lime might be used to advantage in cement mortars, according to results secured by the Bureau of Standards, Department of Commerce. When lime plaster is gaged with cement, it still retains considerable of its former workability, and has gained in strength, while the time of set is reduced.

In this work the bureau found that when cement paste and lime paste were brought to the same consistency, a much greater percentage of water was required by the lime than by the cement. With this relation holding, the percentages of mixing water in cement mortars and in lime mortars increased with a decrease in the percentage of sand. A cement mortar with lime added requires extra mixing water, but this extra water increases shrinkage possibilities, therefore, lime should be limited in cement mortars where it is desired to keep shrinkage low. It is possible to keep shrinkage low by the use of a high percentage of sand in any mortar.

The density of lean cement mortars may be increased by the addition of a small percentage of lime. Where the cement mortar is not richer than 1:2, the addition of lime may result in increasing the strength. The percentages of lime which may result effectively in these respects were found to increase with the leanness of the mortar. It is probable that the lime does more than act as a void filler in lean cement mortars, for it can carbonate and form a binder in the place of the missing cement.

The Mangold Sand Company, Zanesville, Ohio. Capital \$25,000. Harry A. Mangold, Edward R. Meyer, Tom O. Crossan, Elizabeth Crossan and Hope O. Toller.

## The Progress of Agricultural Gypsum

By George A. Olson

Agricultural Director, The Gypsum Industries

There are various reasons why the consumption of agricultural gypsum will increase in 1926. One of them is the return of profitable farming. Another is the desire on the part of the farmer to improve and maintain the fertility of the land. Also there is the desire to provide better sanitary and comfortable environments for the stock. Greater care will also be exercised in control of insect pests and the marketing of better farm crops.

Increased purchasing power makes it possible for the farmer to buy many articles which he went without during the period of depression. Improvement of the land and maintenance of the fertility of the soil contribute to make farming profitable. Sanitary and comfortable environments reduce chances of development and spread of disease. The control of insect pests reduces damage and provides a means for producing more of the select class of crop for the markets.

The role agricultural gypsum performs in making the land fertile and productive is just as important as that obtained through any other system of fertilization. It frequently happens that the soils are more deficient in sulphate sulphur than in phosphorus. Furthermore plants require as much sulphur as phosphorus and it is more easily lost than the latter. Approximately forty million tons of agricultural gypsum are removed from the lands annually through processes of erosion, seepage and drainage.

The need of applying agricultural gypsum to the land as plant food is evident. It serves also as one of the best means of keeping the soil in good tilth. It provides good absorbent properties in the soil and reduces the chances of loss of soil by erosion. The free movement of water and air in the soil is essential to high production.

There is need for agricultural gypsum to rid the soils of alkali which binds and makes soils sticky and impervious to water. There is also need for agricultural gypsum to reduce the magnesium content in soils and thereby make them better fit for the growing of crops.

Agricultural gypsum sprinkled on the floors, gutters, stalls, dropping

boards and over the manure pile serves as a deodorant and fixer of ammonia nitrogen. The fixation of the ammonia with agricultural gypsum depends on the fermentation of manure and the formation of carbon dioxide. The carbon dioxide gas unites with the calcium component of gypsum and the sulphate released combines with the ammonia. The easy exchange of acid radicles is what makes it possible to trap the ammonia nitrogen and save it as plant food. It is also the means of preventing odor. As a result the milk is not apt to be tainted and the stock is made comfortable. Through the judicious use of agricultural gypsum the sanitary conditions in barns are greatly improved.

The use of agricultural gypsum as the carrier of various insecticides has the endorsement of many state entomologists. The farmers who have used the combination of twenty pounds of agricultural gypsum with one pound of calcium arsenate have recommended the combination to their neighbors. Pickle manufacturers, insecticide manufacturers and county agents are helping to make known that agricultural gypsum insecticide dusts give splendid results. After the service of agricultural gypsum as a carrier it becomes valuable plant food.

Another use for gypsum which is rapidly gaining favor is that as a source of mineral in feeding stuffs. It is the best source of mineral calcium, largely, because of its solubility. In addition the gypsum contains sulphur in the form of sulphate. A chick for example at the time it pops out of the egg has only  $\frac{1}{4}$  as much calcium in its make-up as contained in the mature bird. During the period of growth the sulphur requirement is increased thirty-eight times. It is therefore obvious that there is need for a mineral of the nature of gypsum. Similar demands for calcium and sulphur must be met in case of all animal life.

Then too the gypsum is of mechanical value and functions as a mild laxative. Its calcium is available for bone building and for shell formation and its sulphur exists in the oxidized form.

## The New Star Power Shovel

The Star Drilling Machine Co., of Akron, Ohio, is offering a new type of light weight power shovel. Their Model 20 Shovel is full length crawler tractor, light weight, with gasoline or electric power. The machine, although using a skimmer type of scoop, is a full revolving type machine.

The crawler type tractors are full length, giving all the usual advantages of that type of tread. The weight per square inch of tractor bearing surface is approximately 9 pounds. The machine can be turned in a small space. The weight of this machine has been kept down to about 14 tons. The power plant is a gasoline engine of the four cylinder, four cycle type. The accessories include a vacuum system and a self starter. The gasoline tank holds more than a drum of gasoline. It is located on the left hand platform and is accessible for filling. All controls are located conveniently near the operator.

The machine is at present equipped with three types of buckets, i. e. grading, subdigging or ditcher and clam shell. With the grading bucket attached, the machine virtually becomes a boomless shovel. The bucket handle which is about 13 feet long, telescopes into the frame of the revolving deck. This grading bucket has a capacity of  $\frac{3}{4}$  cubic yards. It has a crowding motion of almost 12 feet and a digging radius of about 21 feet. It will grade up or down a steep slope or

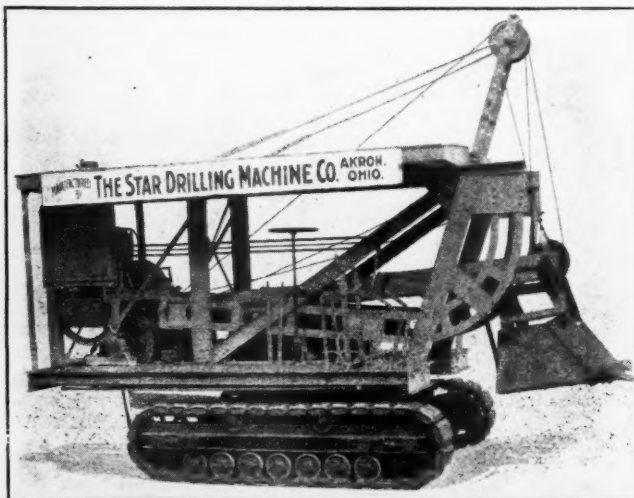
grade off a smooth horizontal bottom at the will of the operator.

The clearance under the bottom of the bucket when dumping at its maximum height is about 17 feet. The machine will completely revolve in a circle 21 feet 4 inches in diameter. The overall length, when dipper handle is retracted, is only 20 feet 2 inches. This makes a compact machine where space is at a premium.

The boomless telescoping scoop handle is a step forward in power shovel construction in that it permits a large capacity scoop with a light weight machine because the weight and load due to shoveling is all concentrated near the center of the machine reducing the necessity of counter weights to a minimum. The mouth of the bucket is 36 inches wide and 36 inches high and the scoop is always in front when digging. This makes it very convenient for working up against a bank. The ditcher bucket is of the boom and pull-in type. The rear end of the boom is clamped fast to the telescoping rack and is arranged so that it can be fastened at a point on the rack selected by the operator as being best suited to his work. This selectivity of pivotal location has the effect of giving a longer or shorter boom, depending on the position selected.

By means of a patented device, the scoop can be held in a horizontal position during its

entire length of stroke, irrespective of the angle of inclination in either direction of both or either the boom and the ditcher beam. This gives a planing action to the scoop. With this patented device, the bucket teeth always cut a clearance for the rear end of the bucket bottom.



Star Power Shovel



## S-A Developments During 1925

The Gilbert Screen and Scrubber is an ingenious new combination brought out by the Stephens-Adamson Manufacturing Company recently is a most successful piece of equipment for scrubbing aggregate and making one separation. It consists of a scrubbing barrel inside their already popular Gilbert Screen. Material is delivered to the inside of the water tight scrubber-barrel where short lengths of chains, fastened at 90 degrees intervals, agitate the material and with the water loosen and remove the dirt.

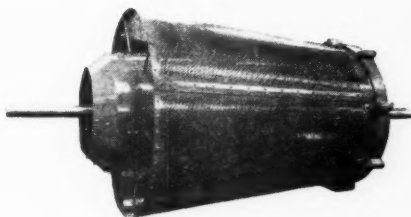
When the material reaches the end of the tube, fixed blades discharge the aggregate to the inside of the Gilbert Screen for final washing and the first separation.

Lo-Hed-Gate, a new over-head gate which saves valuable head room, has been patented by Stephens-Adamson Manufacturing Company. This gate finds a welcome place under storage bins and in the reclaiming conveyor tunnel under the ground storage pile. It is claimed that from six to twelve inches or more (depending on size) of head room is saved, thus permitting the whole bin or tunnel roof to be lowered correspondingly.

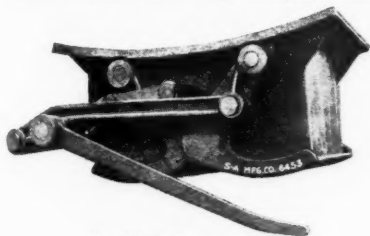
A new way of mounting the Monitor car puller is illustrated here. This self-contained, electrically driven car puller made by Stephens-Adamson Manufacturing Company, will pull several loaded cars by simply snub-

bing a few turns of tow rope around the capstan. Usually the Monitor is set upon a permanent base, but in this case it is mounted upon a standard gauge truck which may be moved to any desired position and clamped to the rails where it is ready to pull cars from any direction.

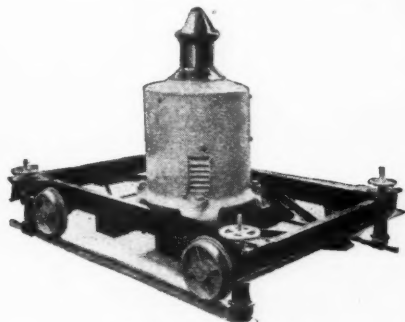
The Self-Aligning Ball Bearing Pillow Block is a new and very efficient bearing for use on high speed conveyor or power transmission shafts where a considerable saving in power should be affected. Two rows of high grade ball bearings take the bearing load and also a certain amount of end thrust. It is also claimed that this bearing is self-aligning and will automatically correct itself for slight inaccuracies in setting.



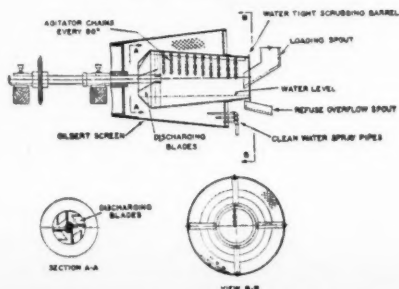
Gilbert Screen and Scrubber



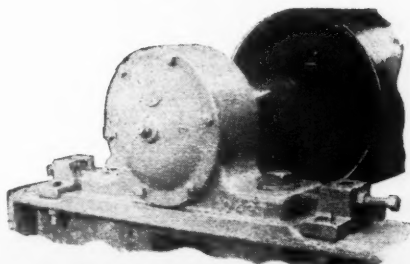
Lo-Hed-Room Gate



Portable Car Puller



Gilbert Screen and Scrubber Layout



Ball Bearing Pillow Block

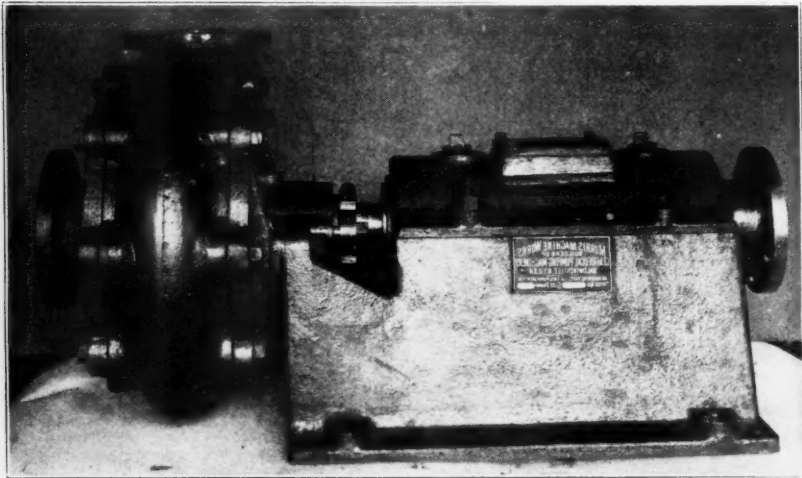
## Morris Machine Works Makes Improvements

There is a decided tendency to cutters and agitators on sand and gravel pumping plants. Reliability and cost of operation are receiving more attention that the initial cost of equipment. One of the accompanying illustrations shows a 12 inch cutter ladder furnished by the Morris Machine Works for some of the sand and gravel pumping plants.

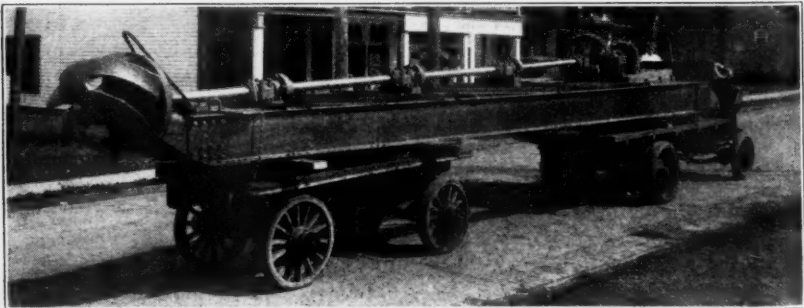
Another development made by the Morris Machine Works had to do with a special dredging pump for handling cement slurry and other similar materials. The slurry pumps are really a compromise between the dredging pump and the high efficiency centrifugal water pump, combining the rug-

gedness and wearing qualities of the dredging pump with the high efficiency of the centrifugal water pump. The regular type of centrifugal dredging pump when used for handling slurry requires a supply of water to the hub to provide a water seal. The water finds its way into the pump and dilutes the slurry.

The Morris Machine Works have a special construction of the hub for their pump and the amount of water added to the slurry can be made less than three tenths of one per cent. This is negligible and at the same time the pump can be operated with a vacuum and the slurry kept from coming out through the hub.



A Horizontal Type of Special Dredging Pump for Handling Cement Slurry



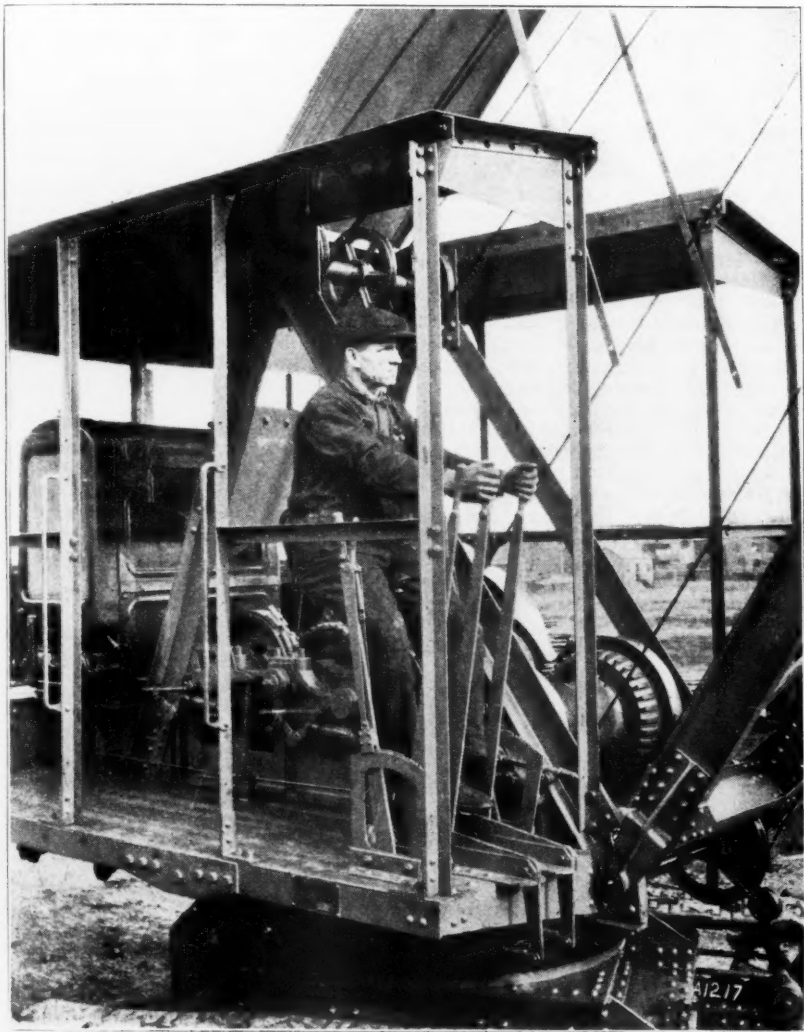
One of the 12 Inch Cutter Ladders Ready for Installation

## New Crawler Crane

A new crawler crane has just been placed on the market by Mead-Morrison & Company. It is built to handle a wide range of drag line and shovel work. A single lever controls the table crowd on the shovel and either pedal is so placed that the operator has complete control of his machine without shifting his position. Each hoist drum is controlled by a single lever. The drag and driving chain can be adjusted for wear and are easily accessible for lubrication

or renewal. The crane is the live boom type, the maximum radius of 30 feet.

The hoist has three bronze bushed friction drums 10 inches in diameter, provided with single cone asbestos lined friction and automatic safety brake. A rotating part of the crane is built with a cast steel main revolving center member. This carries the rotating and travel gearing and has attached on its opposite half 8 inch structural channel for supporting the



The Mead Morrison Crawler Crane

hoist and steel flooring. The travel base is carried on two crawler tracks 92 inches over all in width. The treads are all cast steel of heavy pattern, 12 inches wide.

All sprockets are adjusted for spread of chains and wear of treads or pivots. The crane has a capacity  $\frac{1}{2}$  yard, shovel, clam shell or drag line bucket, with 6,000 pounds at a 15 foot radius and 3,000 pounds at a 30 foot radius. It has a hoisting speed of 150 feet a minute with four swinging revolutions a minute and can travel one mile an hour. Either gasoline or electric power may be used. A Hercules heavy duty four cylinder engine, 4x5 inch piston, 30 to 40 H.P. or a 30 H.P. electric motor.

### Novel Combine of Hoist With Fordson Locomotive

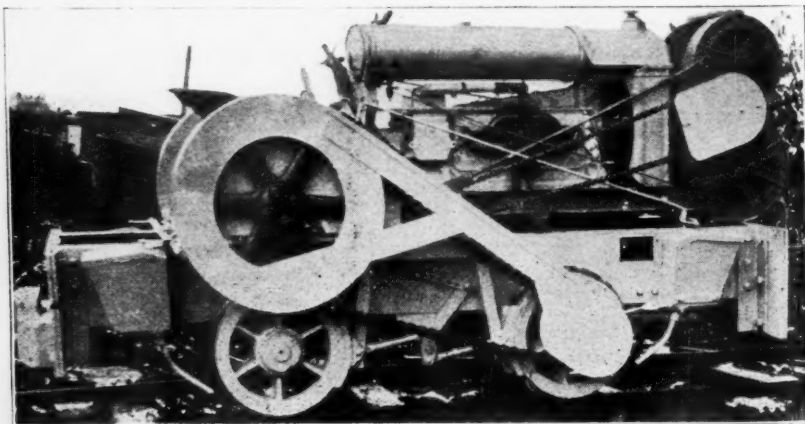
Combination of a Fordson locomotive with a hoist is announced by the Brookville Truck and Tractor Company. The hoist can be employed to bring cars out of a pit, one at a time. The locomotive is capable of hauling a train of six cars from the quarry to a crusher by M. M. Arndorff at his quarry at Strasburg, Virginia. Here the hoist is again used for taking cars over an incline to the crusher. At this quarry this combination takes the place of a locomotive and two additional stationary engines and drums.

The standard Fordson tractor, without any alteration other than discarding wheels, substitution of the front axle and a change in the steering assembly, is used. The loco-

motive frame is heavy ship channel, weighing 50 pounds to the linear foot. Bumpers are sectional cast iron of the standard locomotive type with three pocket couplings. They can be adjusted to any position desired on plate end sills, giving a hitching range above the rail from 7 to 27 inches. A dual system of brakes is used with the standard Fordson transmission through the driving mechanism for use in emergency. The service brakes which are applied by a lever from the operator's seat have 132 square inches of braking service against steel tire. Standard locomotive construction  $\frac{3}{8}$  inch plate, with solid wheel for both forward and reverse work. For transmitting power from the Fordson axle shafts, 50 per cent oversize locomotive sprockets and roller chain are used. The drive wheels are 26 inches in diameter and come with standard steel face. The draw bar pull is  $3\frac{1}{2}$  tons, 1,750 pounds with steel tires, and 4 tons, 2,000 pounds with steel tires. The cab is full length and gives the driver unobstructed view as well as easy access to any part of the mechanism. Roll curtains completely enclose both machine and driver and give protection under extreme weather conditions.

### The Conflicting Conventions

The National Crushed Stone Association Convention and the National Sand and Gravel Association Convention will be held the same week. The N. C. S. A. will meet in Montreal on January 18, 19, 20 and 21st while the N. S. G. A. will meet in Atlanta on January 19, 20 and 21st.



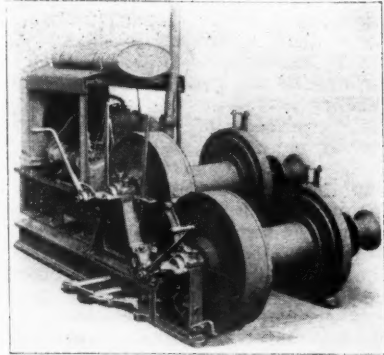
Brookville Fordson Locomotive Combined With Hoist

## New American Gasoline Hoist

The American Hoist & Derrick Co. has recently re-designed its gasoline hoist, changing it from chain to gear drive. The new hoists are driven by spur and bevel gears with an intermediate longitudinal shaft placed at right angles with the pinion shaft, which is the crank shaft on a steam hoist, the gasoline motor being mounted lengthwise instead of crosswise on the hoist.

The pinion shaft of the hoist has a bevel gear near its center which engages with a bevel pinion on the end of the intermediate longitudinal shaft. On the other end of this shaft there is a spur gear which engages with the pinion on the engine crank shaft. The intermediate shaft is mounted at nearly the center lengthwise of the bed and is supported by heavy babbitted boxes. One of the accompanying illustrations clearly shows the gear drive arrangement with the gear guard and drums removed.

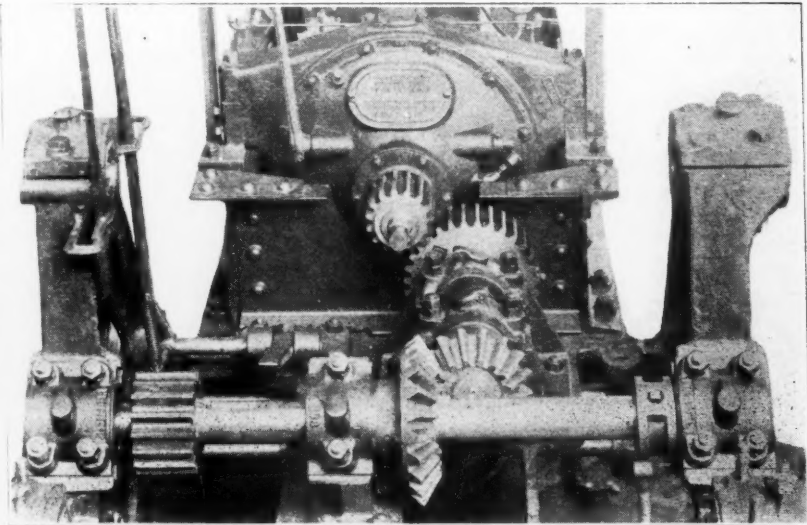
Equipping gasoline hoists with gear drive instead of chain drive gives a number of important advantages, among which are speedier shipment of both hoist and driving mechanism repairs, and ability to change the line speed to meet varying requirements without seriously delaying shipment. However, the principal advantage of the new gear drive over the old chain drive is that power is



Redesigned Gasoline Hoist

transmitted directly to the pinion shaft of the hoist, which is between the two rear drums, and from there to the friction gears by at least two teeth—one to each adjoining friction gear—whereas on the old arrangement power was transmitted to the rear drum and from there to the rest of the drums by only one gear tooth. The entire hoist is mounted on a cast iron bed plate, insuring rigidity and absolute alignment of gearing, shafting and bearings. The gasoline engine is mounted on the bed plate in place of the boiler or electric motor and the hoist is very compact and self contained.

It has the drum equipment of the



Gear and Drive Arrangement with Drums and Guards Removed

regular American steam hoisting engine. By means of the hoist unit system future requirements can be taken care of by bolting one additional drum at a time to the front of the hoist.

Some of the general advantages of gasoline hoists are that they combine the cleanliness of the electric hoist with greater portability. They can be used where electric power is not available, where the water supply is unsuitable for use in steam boilers, or where there is no boiler water at all. Their use is permissible where steam hoists are not allowed; for instance, in and around buildings where the architect will not allow steam boilers. Furthermore, a licensed engineer is not required.

### Adamson-Fordson 5-Ton Locomotive

The Adamson Motor company has put on the market a new 5-ton Adamson-Fordson locomotive, built along the line of the 3½-ton machine which has been produced by this company for several years and is now in use all over the country. The new locomotive has 33 inch wheels with 4 inch tread, made to A. R. A. specifications. The wheel base is 74 inches and the top of the motor is 4 feet above the rails. The height of the top above the rails is 5 feet 6 inches. The width over all is 6 feet ½ inch, 56½ inch gauge. The length over bumpers is 10 feet 1 inch, while the length over the couplings is 12

feet 5 inches. The coupling linkpocket is 12 inches above the rail and is of the M. C. B. standard type. The sand boxes are swung on top posts both front and rear. The frame is of solid steel, one piece locomotive type. The pedestals are jaw machined and the binders are mortised into the frame. Brakes are of the automobile type, asbestos lined and operated from a clutch pedal. Three inch axles are used in both front and rear. The axles are roller bearing and of the same analysis steel as that used by the Ford Motor company. The machine has a four wheel drive with cast iron front and rear bumpers. The rear bumper is attached to the draw bar cap which relieves the axle housings of strain and places the pressure where the designer of the Fordson tractor intended it. The machine has three speeds forward and one reverse with the standard Fordson gearing and weighs 5 tons.

### Haiss Improvements

The George Haiss Manufacturing Company have made some improvements in the Haiss creeper loader. The engine drive is triple with bushed roller pin chain. All set screws are locked in place. Side thrusts on all shafts are taken up by ball thrust bearings. Tailshaft bearings and feeding propeller lugs are split for easy replacement. The elevator buckets are seamless steel forgings. The creeper sprocket and driving pinions are manganese steel.



## A Magnetic Apron Pulley Development

A new type of magnetic pulley, adapted to operate in the discharge end of steel apron or pan conveyors, is announced by the Magnetic Manufacturing Company.

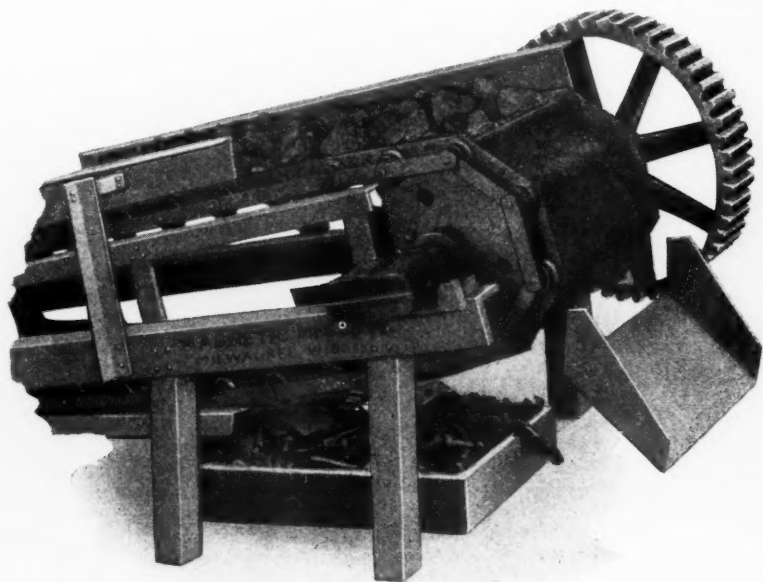
This development is of especial interest to plants that are using steel apron or pan feeders, for feeding the rock directly from bins into crushers or pulverizers.

It has been necessary where apron feeders were employed to first discharge the ore onto a belt conveyor provided with a magnetic head pulley for extracting any contained tramp iron, to prevent injury to the crushers, but with this development the discharge end of the apron or pan feeder becomes a powerful magnetic field, ready to reject any of the troublesome tramp iron, in the same manner as the customary magnetic head pulley. In existing plants where the rock or ore is fed directly into crushers, and trouble develops due to tramp iron it is often difficult to provide the necessary room for the installation of the required magnetic separator. In such a place it is now a simple matter to introduce this type of magnetic pulley into the pan conveyor feeders already at hand,

without the necessity of elaborate changes in construction.

In order to successfully adapt the magnetic pulley to this type of conveyor, it has been found necessary that the poles of the pulley be brought into close contact with the under-side of the steel apron, and the design of the magnet must be such as to cause a penetration of the magnetic lines of force through the steel apron plates. In order to produce the best results the magnet coils are made very large and the pole pieces are made to conform to the shape of the apron plates used, thus making the magnetic pulley of polygonal form. Owing to the unusually heavy loads carried on this type of conveyor, it was found that the standard type of magnetic pulley could not be used with the best results. When due consideration had been given to the depth of material to be handled, however, and with the proper design of the magnet coils, excellent results are obtained.

In order to adapt the pulley to existing conveyor installations, very little, or no, change in the installation is necessary. The magnetic apron pulley is mounted on the shaft



The New Type of Magnetic Pulley

between the regular drive sprockets, the shaft having a drive extension on the other end.

Where it is found desirable to equip existing conveyors with this new style of magnetic pulley, it is desirable to provide the magnetic pulley unit with new shaft and sprockets, so that a quick change can be made when inserting the magnetic unit into position. No additional power is required to drive the apparatus outside of the direct current required on the magnetic pulley. When no direct current is available for operation, a small unit motor generator is usually used in order to supply the necessary direct current for the magnet.

In conveying material with apron or pan conveyors, the depth of the material is usually considerable, but, owing to the moderately slow speed at which this type of conveyor operates, a tumbling or cascading of the material takes place at the discharge end, bringing it into close contact with the steel surface, thus affording a splendid opportunity for the magnetic pulley to get in its work. The iron or steel particles are firmly seized and held tightly to the apron plates, being carried underneath the conveyor and discharged at about the center of the drive, where a box or spout may be provided for catching the separated iron.

### Freight Car Loadings

Loading of revenue freight for the week ending November 28 totaled 923,213 cars, according to reports filed by the carriers with the car service division of the American Railway Association.

This was an increase of 44,082 cars over the same week last year and an increase of 88,132 cars over the same week in 1923.

Due to the observances of Thanksgiving, the total for the week of November 28 was a decrease of 134,461 cars under the preceding week.

Coal loading totaled 172,279 cars, a decrease of 16,903 cars under the week before and 336 cars under the same week last year.

Grain and grain products loading amounted to 48,696 cars, 4,425 cars under the week before and 628 cars under the same week last year.

Miscellaneous freight loadings total-

ed 344,404 cars, a decrease of 51,608 cars under the week before but 31,139 cars above the same week last year.

Loading of merchandise and less than car load lot freight amounted to 232,152 cars, a decrease of 36,258 cars under the week before but 10,252 cars over the same week last year. Forest productions loadings totaled 65,199 cars, 2,698 cars under the week before and 1,967 cars under the same week last year.

Coke loading totaled 14,990 cars, a decrease of 243 cars under the preceding week but 4,357 cars above the corresponding week last year.

Live stock loading for the week amounted to 29,581 cars, a decrease of 6,154 cars under the week before and 3,176 cars below the corresponding week last year.

Ore loading totaled 15,912 cars, a decrease of 16,177 cars under the preceding week due to the usual seasonal decline in ore shipments.

A comparison by weeks follows:

	1925	1924	1923
Nov. 28..	923,213	879,131	835,081
Nov. 21..	1,057,674	1,010,919	992,050
Nov. 14..	1,050,758	1,016,843	992,050
November 7.....	1,063,322	995,279	1,042,221
October 31.....	1,091,273	1,073,374	1,035,424
October 24.....	1,121,459	1,113,053	1,073,841
October 17.....	1,106,114	1,102,300	1,073,095
October 10.....	1,106,099	1,088,956	1,075,938
October 3.....	1,112,462	1,077,747	1,079,775
September 26.....	1,120,645	1,087,964	1,097,493
September 19.....	1,098,423	1,076,847	1,060,811
September 12.....	975,434	1,061,781	1,060,563
September 5.....	1,102,946	920,979	928,916
August 29.....	1,124,436	1,020,809	1,092,150
August 22.....	1,080,107	982,700	1,069,915
August 15.....	1,064,793	1,019,077	1,062,993
August 8.....	1,051,611	941,407	978,750
August 1.....	1,043,063	945,613	1,033,466
July 25.....	1,029,603	926,309	1,041,415
July 18.....	1,010,970	990,230	1,001,350
July 11.....	982,809	909,973	1,019,800
July 4.....	864,452	957,904	850,082
June 27.....	901,341	908,251	1,021,471
June 20.....	982,600	803,546	1,005,432
June 13.....	987,106	902,592	1,008,838
June 6.....	994,874	910,793	1,012,312
May 30.....	920,514	986,209	820,551
May 23.....	986,209	918,214	1,015,532
May 16.....	984,916	913,201	992,319
May 9.....	981,370	908,213	984,078
May 2.....	981,711	913,550	961,617
April 25.....	959,225	878,387	962,578
April 18.....	922,778	876,916	970,042
April 11.....	917,284	880,937	945,271
April 4.....	922,375	961,990	896,375
March 28.....	981,395	907,389	896,375
March 21.....	909,363	908,290	916,818
March 14.....	924,149	916,762	904,116
March 7.....	930,009	929,341	905,344
February 28.....	862,910	944,544	916,624
February 21.....	925,295	945,679	830,187
February 14.....	902,877	935,589	816,646
February 7.....	928,244	906,017	849,352
January 31.....	896,055	929,623	865,314
January 24.....	924,254	894,481	896,464
January 17.....	932,150	894,851	864,297
January 10.....	932,807	872,023	873,908
January 3.....	765,727	706,292	727,246



## The New Hardinge Developments

A new Thickener and Clarifier has just been placed on the market by the Hardinge Company of York, Pa., which is known as the Hardinge Super Thickener and Clarifier.

This Thickener and Clarifier has several distinctive features, an important one being the filter bed in the bottom of the tank which is kept constantly fresh and active by either continuous or intermittent slow rotation of a spiral cutter. The filter bed may be composed of a variety of substances, such as sand, diatomaceous earth, slack coal, or, in some instances, particles classified from the material to be thickened.

The unthickened material is fed into the tank at the center, to one side, or through a variable depth well with an outlet at the surface of the filter bed (depth feeding).

In the Thickener, most of the clear liquid flows over the over-flow weir. In addition, a considerable part percolates through the filter bed and is delivered crystal clear. As the particles settle on the filter bed, they are slowly drawn by the spiral to the discharge well at the center of the tank, where the thickened product is removed by sludge pumps or other means.

The spiral blade is lowered by an adjustable micrometer feed a fraction of an inch into the tank with each revolution in order to carry off the thickened particles that have settled on the filter bed and at the same time to remove a minute film of the filter surface, thus keeping the bed porous. The settling rate is increased by drawing part of the effluent through the filter bed, the slow settling, or dense zones, being drawn down faster than the normal settling rate, thus increasing the quantity of material which can be handled in a given tank by 50 to 100 per cent. Again, depth feeding, which is not generally satisfactory where the straight settlement system is employed, also greatly increases the capacity of the Thickener. Depth feeding is not generally practical in ordinary sedimentation thickening, but it is not very effective on many materials, especially with very thick or very dilute feed. Density of discharge is increased, approximating that obtainable in vacuum filter cake.

The Super Thickener lends itself to a great variety of problems, such as

the recovery of fine coal from washeries, slurry thickening in cement plants, thickening and mixing two or more products simultaneously, heap leaching, sewage disposal, counter current washing and many others. Except for minor changes, its construction for use as Clarifier is the same as for thickening.

Ordinarily in the Clarifier, all the liquid is drawn through the filter bed, although an overflow may be maintained if desired. The filtrate is always crystal clear, unless the liquid itself is colored, as colors due to suspension in the liquid are removed. Upkeep costs are very low as the filter bed will last between four and five years before requiring renewal.

The application of the Clarifier is very broad, some of the uses being clarification of cyanide solutions, acid solutions and sugar: filter of oil and gasoline, city water, boiler feed water, and the prevention of stream pollution by clarifying waste liquids. There has never before been a satisfactory machine for the removal of small turbidities, especially when the solids composing turbidity are of a gummy nature. Hardinge Company Bulletin No. 30 gives a complete description of the Thickener and Clarifier.

The Hardinge Rotor Spray was designed to eliminate the difficulties usually attendant upon the use of nozzle sprays or high pressure pumps. It is a comparatively smooth, cylinder with closed ends, machined and balanced, installed in a chamber or housing, and mounted on a shaft over a small sump tank, in which is the liquid to be sprayed. It may be direct connected to a motor or driven by chain or belt. As the revolving Rotor touches the liquid, a thin film is caught and thrown up by centrifugal force in the shape of a fan. The smooth surface of the Rotor is responsible for the spray being thrown during the entire revolution of the Rotor, and not on the rising side only, which would be the case if the surface were corrugated. This fact is also responsible for the large capacity and the low power consumption. A 12 in. diameter by 4 ft. long Rotor, driven by a 1 h.p. motor has a capacity of 150 gallons per minute.

The depth of immersion of the Rotor governs the capacity, and the degree of atomization is controlled

largely by the speed of the fan.

The application is very broad, some of the uses being dust collecting, air washing and humidifying, air conditioning for industrial purposes, air or gas scrubbing, gas cooling, cooling or heating liquids, acid absorption and concentration, aeration, mixing and emulsifying.

Because of the simplicity of construction, operation is easy and maintenance is low. There is a minimum of moving parts, with nothing to clog, choke or get out of order. Much of the auxiliary equipment necessary with large installations of nozzle sprays can be eliminated with the Rotor Spray. It can be easily built of corrosion or erosion resisting materials.

The Hardinge Material Distributor is an interesting piece of equipment, which will meet a definite need wherever an even distribution of coarse or fine, wet or dry materials is desirable over stationary or moving surfaces.

It is simple in construction—there are no moving parts. It is adjustable as to degree of angle, or curvature, as well as elevation, and adjustments can be made during operation.

The surface is covered with a newly developed soft rubber, which is acid proof and has a longer life than metal of the same thickness.

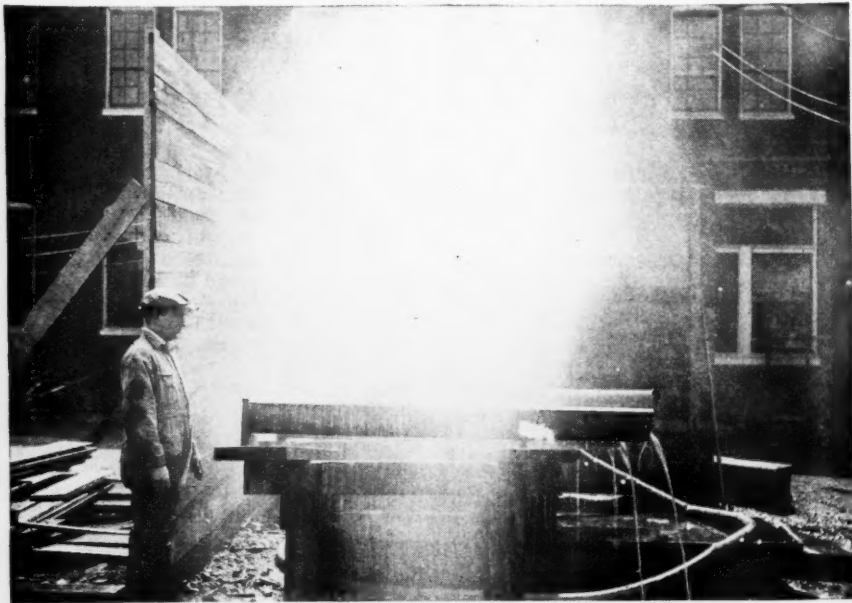
## An Explosive Development

Following many experiments both in the laboratory and in the field, the Hercules Powder Company recently announced a new high explosive—Hercules Special No. 3. It is designed for underground mining where fumes are important and it is adapted for underground work in ore, shale, clay, gypsum, and, because of its non-staining qualities for use in salt mines.

Hercules Special No. 1 and Special No. 2 were two of the important contributions of recent years to the blasting industries. Where these explosives are suitable, a 15 per cent reduction of blasting costs by their use is not uncommon. They are most widely adapted to quarry and open-pit work.

The economy of Special No. 1 and Special No. 2 naturally appealed to the underground miners, also. They are used successfully in some underground mines, but their fumes make them unsuitable for others.

The newly developed Hercules Special No. 3 has all the advantages of Special No. 1 and No. 2 with better fumes. It makes it possible to reduce costs underground to the same extent that Specials No. 1 and No. 2 reduce costs in the open.



Hardinge Rotor Spray

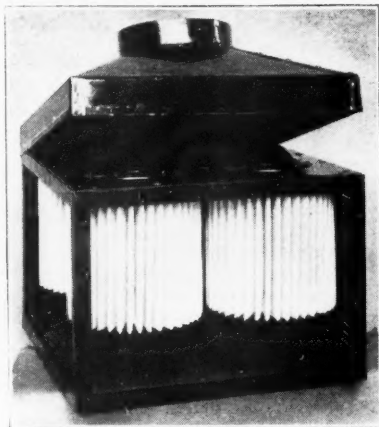
## Air Filter Developments

Quarry and pit operators are finding that the use of filtered air has greatly simplified their maintenance problems and reduced their repair bills; and the manufacturers of compressors are feeling a pronounced demand for Protectomotor air filters on all of their equipment.

The application of Protectomotor filters to air compressors has placed at the disposal of engineers and operators of compressed air machinery the same advantages of efficiency, low maintenance cost and simplicity of construction which have led to the adoption of the Protectomotor by many of the leading automotive and equipment manufacturers. The Protectomotor, which consists of a felt filter surface supported on wire screen radial fins, is applicable to a wide variety of air filtration duties and is capable of handling an unlimited range of capacities.

Because of the large filter surface available, the air speed through the felt is reduced to a velocity low enough to eliminate the heavier particles of sand and grit by gravity, the finer particles, only, collecting on the surface of the felt.

The felt filter inserts are encased in a perforated aluminum shell when used on portable installations and in this form are standard equipment on Sullivan Portable Compressors in addition to being used and recommended by the Ingersoll-Rand Co.,

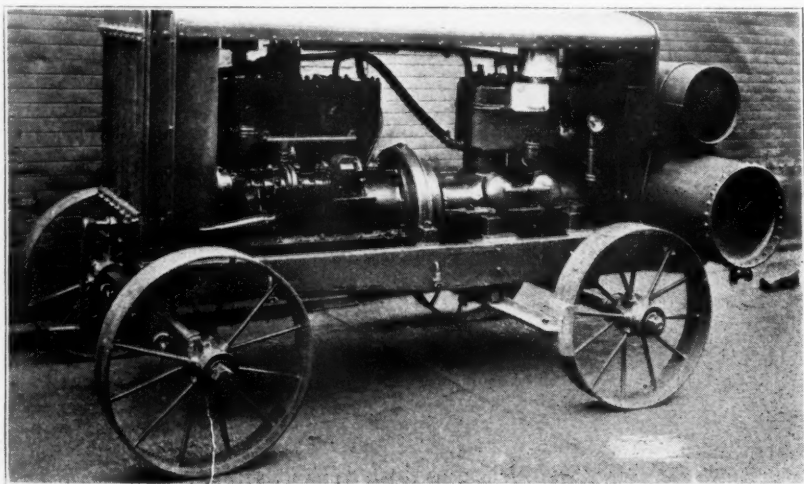


Filter with Side Plates Removed

Chicago Pneumatic Tool Company, Curtiss Company and others.

As direct an installation as possible is made on these machines; in some cases the Protectomotor is mounted directly on the intake flange. Where space will not permit of direct mounting the filter is connected by a pipe manifold; or supported on a bracket and connected to the intake by a flexible metallic tubing.

The Protectomotor is also fitted to the motors of the portable compressors and the cost of engine and compressor maintenance has been found to be reduced by 50 to 70 per cent.



Protectomotor on Portable Compressor

For large, permanent air compressors, the felt filter inserts are mounted on sheet metal manifolds in any required capacity. The size of insert used on this type of equipment is designed to pass 250 cubic feet of air per minute and contains about 20 square feet of filter surface in a cubic foot of space.

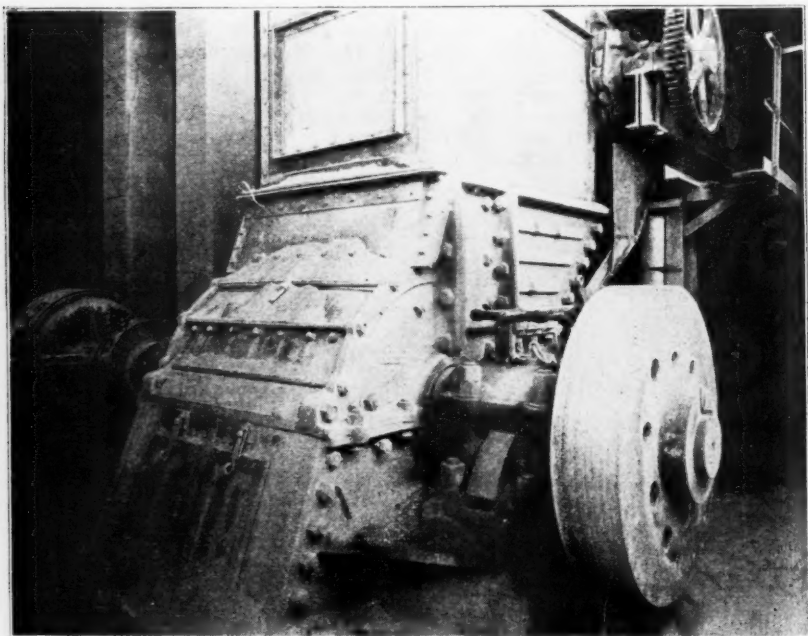
The ability to operate at high efficiency for long periods of time without attention and the ease of cleaning, at the infrequent intervals when it is required, has led to the selection of the Protectomotor for service under a variety of rigorous conditions.

### Williams Crusher Makes Progress

An improvement which the makers claim will be of special interest to quarry operators working during wet weather on stone containing muddy overburden is announced by the Williams Patent Crusher and Pulverizer Company. It is a rotating raker plate designed to overcome clogging in the "Mammoth" and "Jumbo" types of crushers manufactured by this company. The device operates mechanically and the manufacturers claim it absolutely prevents clogging or choking of the crusher by wet material. It requires no special drive as it derives its power directly from the crusher shaft.

The "Mammoth" crusher manufactured by this same company has

made some unusual economies in various operations this year. In three cases during 1925 this crusher was installed to reduce 48 inch rock to 1½ or 1 inch in one operation. The new Fort Worth plant of the Trinity Portland Cement Company one Williams "Mammoth" crusher does all the raw material crushing. It takes steam shovel size feed up to 48 inches and reduces to ¾ inch in one operation at the rate of 300 tons per hour. The San Antonio Portland Cement Company at San Antonio, Texas, are also securing equally good results. The Australian Cement Limited, of Australia, are also handling rock as large as 48-inches and reducing to 1½ inches with a Williams crusher.



The Williams "Mammoth" Crusher at the Fort Worth Plant of the Trinity Portland Cement Company

## Link-Belt Builds New Belt Conveyor Tripper

One of the many new contributions which Link-Belt Company has made to industry, during the year 1925, is the new Link-Belt Steel Frame Tripper for Belt Conveyors. This new device is made for either hand, semi-automatic, or full automatic operation. The design is simple. Light weight, has been combined with strength. The frame sides are of steel plate. The cross members are also of steel. The bearing mountings fitted to the tripper sides are adjustable and self aligning. Each of the bearings is provided with a positive pressure lubricating device. The wheel housings is a "Safety-First" feature, which eliminates any chance of a person being caught by the tripper wheels.

The number of parts has been reduced to a minimum; all are accessible for inspection and quickly adjustable if necessary; all moving parts are contained within the frame. Long wheel base and low height make it practically impossible to overturn. This feature enables the tripper to operate in a minimum of headroom, and lessens the amount of power ordinarily required to elevate the material over the discharge pulley. The

tripper pulleys are of liberal diameter, greatly reducing wear on the belt. All pulley shafts are run in either plain babbitted bearings or anti-friction roller bearings.

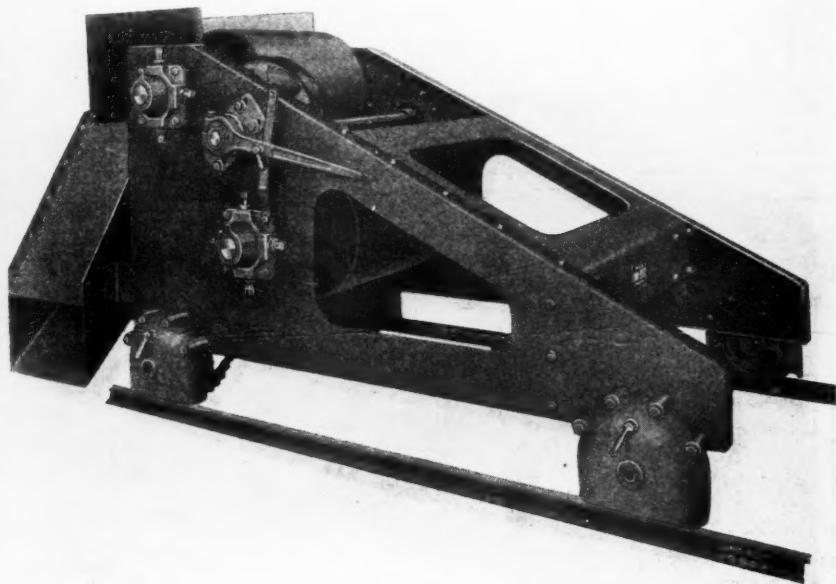
The full-automatic type (self-propelling and self-reversing) is used for distributing material uniformly along the conveyor. Stops at each end engage the reversing mechanism so that the tripper will travel continuously back and forth without attention after starting.

The hand operated, semi-automatic and full automatic tripper are of the same general design.

### ROL-MAN DEVELOPMENTS

Among the new products introduced recently by the Manganese Steel Forge Company are:

1. Dredge pipe of rolled manganese steel plate with welded joints.
2. Dredge chain of rolled manganese links with high tensile strength and accuracy.
3. Rolled manganese steel concrete mixer liners and mixer parts.
4. Brick and block mould liners and parts of moulding machines for their manufacture.



New Tripper for Belt Conveyor

## Bucyrus Improvements During 1925

Any manufacturer of excavating machinery must be continually improving his product in both workmanship and design. It is, therefore, often a difficult task to single out the most outstanding achievements for a given time. The four following have been chosen by the Bucyrus Company, manufacturers of excavating machinery, as among the most important of their accomplishments for the year 1925.

First—The announcement of a 4-yard full revolving shovel for quarry and mine service. This machine, designed for rock digging and called the 120-B, is claimed to be much more rugged than even the railroad type shovel. It combines the speed of action of the railroad type shovel and its tremendous power, with the full circle swing, long reach and other advantages of the Whirley. The machine weighs approximately 140 tons and is built for either steam or electric power.

Second—Fourteen years ago, caterpillars were first applied to shovels and draglines. This year this company has applied a mounting of this type to one of its big Class 320 drag-

lines, a machine weighing nearly 400 tons and equipped with an 8 cubic yard dipper.

Third—Electric shovels driven by three shunt motors with Ward-Leonard control have been introduced. The shunt motor with Ward-Leonard control has been used for some time on both the swing and hoist of electric shovels, but its application to the thrust is believed to be new.

Fourth—A dipper dredge even larger than those used in constructing the Panama Canal, is at present under construction. This huge dredge, although the dipper capacity is only 10 cubic yards (those at Panama were 15 yards), is probably the largest and most rugged machine of its kind ever built. This dredge is driven through electric motors by Diesel engines. The horsepower is 1200. As far as is known, it is the only large dipper dredge to be driven by Diesel engines.

The Annual Banquet of the Wisconsin Mineral Aggregate Association will be held in Milwaukee at the Elk's Club on Thursday December 17th at 6:30 P. M. The success of the last annual affair assures a big gathering.



Bucyrus 120-B Electric Shovel

## Developments by Allis Chalmers

The latest developments in crushing and cement machinery brought forth in the year 1925 by the Allis Chalmers Manufacturing Company are interesting. A number of additions to their standard lines of machinery have been made, while the established types and sizes of machines are constantly being improved in minor details. A number of crushing plants and one cement plant have been designed by Allis Chalmers engineers during the year, and have already been put in operation or are now in the course of construction. A number of interesting engineering problems had to be solved at these plants, and new ideas as indicated by the trend of development have been incorporated in their design.

### Crushing Machinery

The regular lines of style "N" and Superior McCully crushers have not been greatly changed. Minor details are always being improved, and details of design which were found to be successful on certain sizes of machines were adapted to other sizes. This company during the year 1925 recorded one of the largest orders ever placed at one time for this type of equipment. This contract covered an order for two 60 inch Allis-Chalmers Superior McCully crushers, three No. 10 McCully crushers and five No. 9 Style "K" crushers, besides a large number of repair parts and considerable auxiliary equipment, such as oil tanks, oil cooler and filter and oil pumps for a forced feed oiling system, with which the crushing plant will be equipped.

This order was placed by the Chile Exploration Company of New York City and the Andes Copper Mining Company, which is a subsidiary of the former. The final destination of this machinery is South America.

The heavy 60 inch gyratory crushers were subsequently designed in the Allis Chalmers engineering department, in cooperation with the engineers of the Chile Exploration Company. At the present time the crushers are being built in the Allis-Chalmers shops. The new 60 inch crushers are the heaviest crushers that have ever been built by any company engaged in the manufacture of stone breaking equipment. The rugged construction is exemplified by the weight of these machines, one crusher weighing close to 1,600,000 pounds.

The crushers are built almost entirely of steel castings and forgings. The tremendous capacity, with regard to the size of the feed as well as the tonnage, may be judged by the size of the receiving opening.

The line of Superior McCully Fine Reduction crushers has been further developed. This type of crusher has up to now been built in two sizes only: 6 inch and 10 inch. An 18 inch machine has now been added to this line and is at present fully developed. One machine is now being built for a large cement plant in California. This size of breaker combines the sturdiness of construction and all the other advantages of the fine reduction crusher with the increased capacity inherent to the larger sizes.

### Cement Making Machinery

No radical departures from established lines of design of the cement making machinery have been made. The Compeb mill is constantly being improved in the details of its construction. A new refinement in the design of the mill, enhancing its qualities of being adapted to numerous kinds of services, was introduced through the newly designed multiple-diameter Compeb mill. The preliminary grinding compartment is made larger in diameter than the finish grinding compartment. A new means of adjustability of the mill to many different kinds of materials is thus provided. A number of No. 87 mills (the numbers designating the diameter of the two compartments) have been installed in cement plants. Among them are mills which are designed for wet grinding as well as mills for dry grinding. An important step toward still higher efficiency of the dry grinding Compeb mill has been made through another new development.

The combination division head, heretofore used on wet grinding mills only, has been adapted to the dry grinding mill. This type of division head discharges the material, after it has passed the preliminary grinding compartment of the mill, into a trough located underneath the mill, and charges it to the finish grinding compartment by means of scoops rotating with the mill. This development opens a way for applying a new principle in dry grinding. By means of a dust collector and an air separator, connected to the discharge of

the mill, a stream of air may be drawn through the finish grinding compartment, which takes part of the fines out of the material and leaves the coarser particles in the mill for further grinding. This not only tends to increase the efficiency of the mill in so far as capacity is concerned, but also makes for the highest degree of fineness and uniformity of the finished product. Furthermore, the complete arrangement is entirely dust proof, and conforms in this respect to modern ideas of sanitation incorporated in the latest designs of cement and similar plants. A new instruction book, covering the erection and operation of wet and dry grinding Compeb mills, will come off the press within a short time.

A new type of feeder, the table feeder, has been developed and added to the Allis-Chalmers line of feeders. The material drops down from the bin onto a rotating feed table, by which it is distributed. An adjustable feed pipe sleeve and adjustable scrapers provide reliable means for regulating the feed. The feeder can be used to handle any kind of dry material suitable for feeding to a Compeb mill, and combines simplicity and strength of construction with a positive regulating action.

#### New Crushing and Cement Plants

A number of new crushing plants and one cement plant, designed by Allis-Chalmers engineers and equipped with Allis-Chalmers machinery, have been put in operation during the year 1925, or are now in the course of being erected. They are the following:

The No. 18 "N" crushing plant of the Columbia Quarry company, Columbia, Ill., is remarkable in several respects. The layout of the plant is arranged so that quarry operation is made possible on two different levels, and the primary breaker can be charged with stone received from either one of these levels. The plant is entirely fireproof, being constructed of steel and concrete throughout. The 36x36 inch double friction hoist is just now being equipped with an Allis-Chalmers Texrope drive.

The 36x60 inch Fairmount crusher plant of the Florida Rock Products Company, Tampa, Fla., is equally remarkable for the compactness of its arrangement, the machinery being located so as to obtain the utmost economy in space required, without

hampering in any way the freedom of circulation of the personnel. The nature of the material made it necessary to install very complete washing facilities, and all the material which enters the plant is being washed. The plant is equipped with picking belts for removing large pieces of clay which are brought out of the quarry with the stone.

The Lake Erie Limestone Company's plant, a No. 21 "K" crushing plant, located at Hillsville, Pa., is built completely of structural steel. It will be one of the most up-to-date plants in the country, inasmuch as exhaustive use has been made of speed reducers. They are used for direct connecting all classes of machinery to high speed motors, thus economizing in initial cost of motors as well as in operating and repair costs of belt drives.

Complete new crushing plants, or important additions to already existing plants, were also designed and put in operation during the past year as follows:

Blackwater Stone Company, Blackwater, Mo. This plant is a 30 inch Superior McCully crushing plant.

Camp Concrete Rock Company, Ocala, Fla. The existing crushing plant of this company was revised, and two 24 inch Fairmount crushers and other machinery installed.

Cherokee Rock Asphalt Company, Cherokee, Ala. A 36 inchx60 inch Fairmount crushing plant.

The Milwaukee Electric Railway & Light Company, Milwaukee, Wis. A 20 inch and 10 inch Superior McCully crushing plant.

The Whiterock Quarries Company, Bellefonte, Pa. Additional screening equipment for their existing plant.

Westmoreland Limestone Company, Pittsburgh, Pa. An addition, consisting of a 10 inch Superior McCully fine reduction crusher and other machinery, to their present plant.

Complete drawings have been made and the machinery has been furnished by the company for the wet process cement plant of the Calaveras Cement Company, San Andreas, Calif. This plant is now being erected. It is a modern plant in every respect. Most of the machinery, including the kilns and the coolers, is driven by direct connected motors, through speed reducers. The slurry feeders are driven through variable speeders by direct connected motors, which are interlocked in such a way with the



kiln motors that their speed adjusts itself automatically to the speed of the kilns. The most elaborate piping system has been installed, connecting the slurry storage tanks with each other and with the correction tanks, so as to realize every conceivable combination for correcting and conveying the slurry. Extensive use has been made of our air operated slurry pumps and centrifugal pumps, thus eliminating almost entirely the installation of elevators and conveyors.

A unique plant, designed by Allis-Chalmers engineers and principally equipped with Allis-Chalmers machinery, is being built for the Ohio Marble Company, Piqua, Ohio. This is a pulverizing plant, which will produce pulverized limestone for agricultural purposes. The plant is completely equipped with a dryer, preliminary, Ball-Peb mill, Hummer screens, air separators, belt and screw conveyors, and other accessories, arranged in such a manner that various sizes of product can be obtained at will, and full use can be made of the large storage facilities, for which provisions have been made. The plant is laid out on a unit system basis, one complete unit of apparatus being installed now, while building provisions have been made to allow the installation of additional units at a later date.

### Denver Progress

During 1925 the Denver Rock Drill Manufacturing company perfected their model 15 Waugh concrete breaker, the model 118 Waugh clay trench digger and the model 100 double drum electric scraper hoist.

The model 21 Waugh turbo hammer drill mounted on a derrick rig has grown in popularity to a great extent for primary drilling where the face or bench is not over thirty feet in height. This machine is fast in drilling speed and also cleans these deep holes perfectly. The derrick permits a maximum run on each bit before changing steel. On a twenty foot bench only three changes are necessary.

Waugh rock drills are also being successfully applied to channeling work in many marble quarries. For this work the drills are mounted on a quarry bar and a series of holes are drilled to the required depth and angle. A broaching tool removes the ribs between the holes.

### Strenes Metal and Chutes

Strenes metal has been developed by the Advance Foundry company for the use in any machines where parts are subject to severe wear or abrasion. It can also be used successfully, the manufacturers claim, in any castings which must withstand heat without developing warp or distortion. At present, Strenes metal is being used in the clay, sand and gravel, crushed stone, lime, cement and slag industries, for the following parts:

Mullers and tracks in wet and dry grinding pans.

Chutes and chute liners.

Lifters for waste heat kilns.

Pump shells, liners and impellers.

Conveyor pipe and connections.

Screw conveyors and housings.

Ball and rod mill liners.

Kiln feed spouts.

Gravity screens.

Car wheels.

Rolls—and various other parts.

The product is also used to advantage, it is claimed, in castings which have certain portions of a wearing metal in conjunction with a softer and machinable metal in other portions. Industries using chutes for distributing abrasive materials will be interested in the use of this product designed to effect saving in installing and maintenance costs.

The Strenes chute has no sharp corners to retard flow and increase abrasion. The only support required is a pair of four by fours. No bolts or fastenings appear in the wearing surface. Lap joints assure good alignment and do away with any chance for low spots or pockets, and serve as a water joint in washing operations. The manufacturers say their metal is not only extremely hard and tough, but is also long grained, and the structure is such that the grain runs through the casting regardless of thickness, thus assuring that all wear is taken on the end of the grain. They report that recently a manufacturer subjected a sample casting to sixteen heats of six hours duration each, at 1600 degrees Fahrenheit and reported no warp and the appearance of the casting unchanged.

The metal chute liners are furnished in any thickness, from five-eighths of an inch up. Liners of one inch in thickness have bolt holes countersunk on one side only. Those thicker than an inch have bolt holes countersunk on both sides.

## New Vulcan 12-ton Locomotive

Announcement has been received from the Vulcan Iron Works, Wilkes-Barre, Pa., that another addition has recently been made to their line of worm gear drive gasoline locomotives. This has reference to a 12-ton model, known as Class EW-12. The locomotive is similar in general design and construction to the other worm drive machines this firm has been building in recent years.

The outstanding features of these Vulcan locomotives are quite generally known by this time,—cast steel frames, steel tired wheels, worm drive on rear axle, side connecting rods (no chains, no sprockets), constant mesh transmission gears, etc.

The 12-ton model is equipped with a 100 h.p. Waukesha motor with Ricardo head. The transmission is designed for four speeds forward and four equivalent speeds in reverse, ranging from 2 3-10 m.h.p. in low gear up to 12 m.h.p. in high. The drawbar pull in high gear is 2,275 pounds with a starting force in low of 7,200 pounds.

This locomotive is built in all the prevailing track gauges and can be adapted to any class of haulage service. It is particularly suitable, however, on account of its power and sturdiness, to take care of standard gauge switching. The standard gauge model of this size has one very exclusive and admirable feature in the

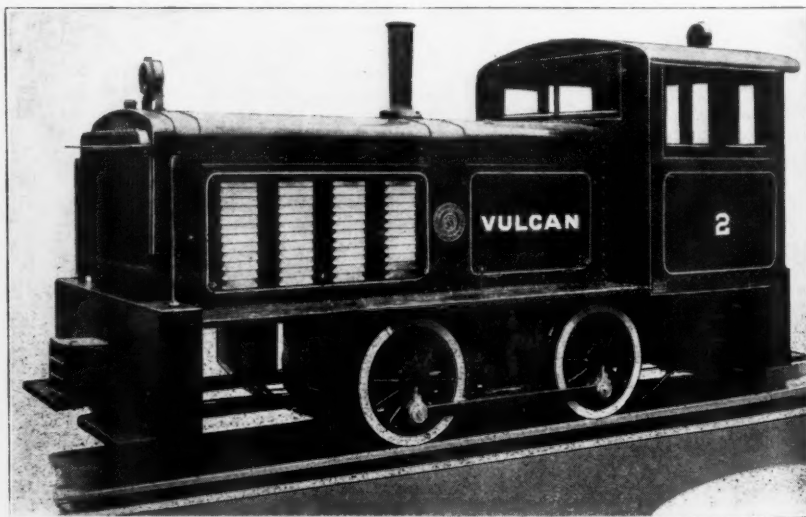
spring draft rigging which is furnished in the bumpers with M. C. B. automatic couplers. This rigging is designed so as to take up in the bumper all the shocks of coupling and the strains of pulling and pushing railroad or other heavy cars. In this manner the motor and other working parts are protected and longer life assured.

With this new model on the market the full line of Vulcan gasoline locomotives now consists of 4, 8, 12, 16, 20, 25, and 30 ton machines.

The Dexter Portland Cement Company has bought the plant of the Penn Allen Cement Company. This purchase also includes the plant of the Industrial Limestone Company. Plans are being considered which will increase the capacity of the present Penn Allen plant more than fifty per cent.

The Trumbull Cement Products Company, Warren, Ohio; capital \$6,000. R. Scholtz, H. R. Robt. and Alfred Engster and Carl Zeyfang, incorporators.

The Golden Dredge Crushed Rock Company, Denver, Colo., capital \$20,000; William Crowley, Patrick Huggins, Harry Lamont, incorporators.



New Vulcan 12-ton Gasoline Locomotive

## Milwaukee Adds to Locomotive Line

The Milwaukee Locomotive Manufacturing Company has just added two new sizes of gasoline locomotives to their type "H" line. These new locomotives are 18 and 20 ton machines, are built for all gauges of track from 30 to 56½ inches, and have inside wheels. The complete line now consists of the following nine sizes; 4½, 6, 7, 8, 10, 12, 15, 18 and 20 tons.

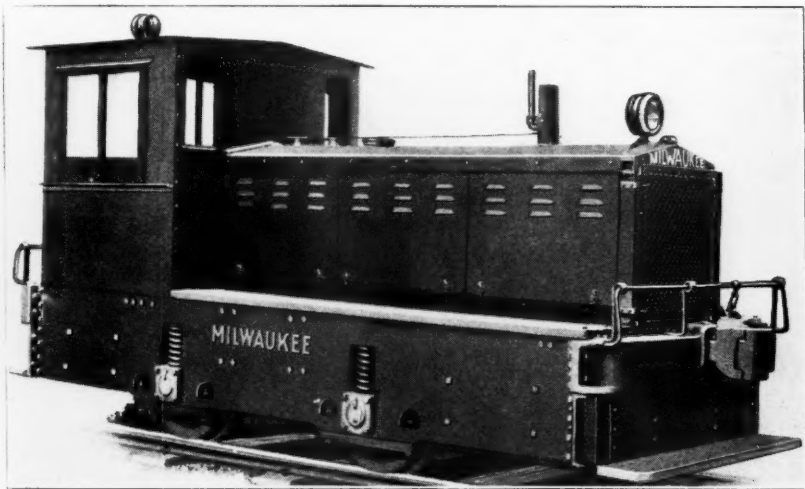
These latest 18 and 20 ton sizes are of the four speed gear and chain drive type, and are geared for four speeds of 2, 4, 6, and 12 miles per hour both forward and reverse. The frame is made of massive steel side frames with re-enforced channel iron and sills. Either link and pin or standard M. C. B. couplers can be furnished. The design of the frame is such that the center of gravity is exceedingly low. The axles are forged steel (1035 S. A. E.) heat treated.

The wheels are rolled steel, 30 inches in diameter, and have standard industrial flange, except for 56½ inch gauge machines which have M. C. B. flange. The journal bearings are of the "Hyatt Roller" heavy duty type with solid inner and outer sleeves. The transmission is of the jaw clutch and gear type. In this type of transmission the gears are always in mesh, the speed changes and direction of travel being effected by means of jaw clutches. The design of this transmission eliminates all possibility of stripping the gears, and there can be

no clashing. All the gears have exceedingly wide faces and are made of chrome nickel steel forgings, except the final driving gear and pinion which are made of steel castings.

One of the important features of this transmission will be found in its general design, which permits the removal of the various covers and housings for inspection of the gears and the entire dismantling of the transmission without removing the transmission case proper from the locomotive. Another feature of importance is the method of mounting the final drive shaft in the transmission, in which the driving sprockets are centrally located between two bearings, thus providing the most rigid and sturdy construction, and eliminating the use of a separate jack shaft.

The driving sprockets are made in one unit of high grade steel, hardened and heat treated. They are pressed and keyed onto the drive shaft of the transmission. The very highest grade of Chrome Vanadium Roller Chains are employed to transmit the power from the transmission drive shaft to the axles. The chains are comparatively short, due to the fact that the driving sprockets are centrally located between and slightly higher than the axles. Standard, hand operated four-wheel brakes of the spread type are employed, but these locomotives can also be equipped with



New Type of 18 Ton, Four Speed Milwaukee Gasoline Locomotive

straight or automatic air brakes when specified.

The engine is of the well known "Beaver" six cylinder Heavy Duty type, having overhead valves, forced feed oiling and being equipped with maximum speed regulating governor. The carburetor is a Wheeler-Schebler Model A.T. and is equipped with a united air cleaner. The clutch is of the "Hele-Shaw" heavy duty type. The entire power unit is mounted on a substantial sub-frame, assuring perfect alignment, absolute rigidity, and providing extreme accessibility to all working parts.

The cab is large and roomy, of steel construction and has sliding windows and the operating levers, clutch pedal, switches, etc., are conveniently located in the cab. A high tension two-spark magneto with impulse starting coupling is used. The locomotive is equipped with Leece-Neville 12-volt lighting and starting system and Westinghouse battery.

### Excavator Improvements

The Bay City Dredge Works have developed a new Model 4 one man convertible excavator which is available with skimmer and trench scoops in addition to the standard  $\frac{1}{2}$  yard shovel.

The skimmer bucket is excellently adapted to shallow excavation such as is frequently encountered in some stripping operations. The advantage of the skimmer is in its ability to fill the bucket on even the shallowest cutting and in its ability to leave a smooth grade. Top soil can be removed from a gravel deposit without mixing the top soil with any of the deposit.

The trench scoop can be used for

taking sand or gravel from a pit with a  $\frac{1}{2}$  yard bucket. It provides ample digging power and still permits the use of the excavator from the top of the bank. The trench scoop will dig to a depth of 12 or 14 feet and load cars, trucks or wagons on top of the bank.

### Improved Timken Bearing

An improved type of Timken tapered roller bearing, differing from the well-known Timken bearing in major refinements, but retaining all essential elements of the Timken tapered design, is now in production. Nickel-molybdenum steel has been adopted for all bearings. The design of the roll has been changed so that the surface of the large end presents a right angle relation to the center line of the roll. The contact then between the large end of the roll and the rib of the cone is in two areas, the rib of the cone being slightly undercut. This two-area contact insures perfect axial alignment between the center line of the roll and the center line of the bearing at all times. An added purpose served by the two-area contact is self-alignment of rolls on cone, in the cup without resorting to a cage fixture to retain the alignment. The primary purpose served by the cage is to retain the rolls, properly spaced about the cone and to make the cone with its set of rollers a unit assembly. The Timken cage has been improved along with the cone and roller assembly. Previously, the cage was cold pressed into the shape of a cup, the bottom stamped out and the pockets for the rolls punched out, one at a time, by an automatic punch press.



The New Model 4 One Man Excavator

## The New Wilford Power Shovel

The Wilford is a Fordson power shovel manufactured by the Wilford Power Shovel Company. This company is located in Detroit, and has 27 distributors located throughout the country. William Ford, a brother of Henry Ford is president of the company. The machine has 100 standard Ford parts. The shovel was designed and is built by recognized and successful builders of excavating machinery.

Power for operating and propelling the shovel is derived from a Fordson tractor equipped with a governor. Every bearing is lubricated by the Alemite high pressure lubrication system. The motor is started with gasoline and once started it can be operated with kerosene.

The dipper is of plate construction with four manganese teeth. It has a capacity of one quarter yard. The boom is of channel construction with two 6-inch members 13 feet long. The boom is raised and lowered by worm and worm gear, which are self locking and hold the boom at any desired angle. The dipper handle is of channel construction with two 5-inch

members 8 feet long. The dipper handle socket is an electric steel casting provided with adjustment for dipper braces to change rake of dipper when desired. The mast is of channel construction with two 7-inch members fastened at lower end to swing circle casting and the upper end supports the mast head casting.

The swing circle consists of one electric steel casting on which all machinery bearings are cast integral. It will swing three-quarters of a complete circle where automatic spring bumpers stop it. The crowding device is operated by a Ford one-ton truck worm gear which is reversed by two friction bevel pinions. The crowding drum is mounted on a worm gear shaft. There are no chipper shaft pinions, gears or brakes used with this arrangement. A single cable operates the dipper handle up or down.

All shafts running 100 r.p.m. or more have Timken roller bearings. All other bearings are of highest grade babbitt or bronze bushings. All gears are forged from special high carbon steel. All shafting, pins, etc.,



New Wilford Power Shovel

are also made of special analysis high carbon steel. The clutches are positive acting and lined with Thermoid. The main clutch disconnects the tractor power from the shovel machinery either when the shovel is moving or when it is not operating. Hoist, crowding and swinging are operated by three hand levers and one foot pedal operates complete digging control. When used as a crane the Wilford shovel will easily lift loads up to 4,000 pounds.

The machine will find many applications in excavating and material handling in the sand and gravel plants and also in quarry operation. The mechanism is simple, sturdy and efficient. It is a speedy operating shovel. It will certainly fill the need between hand digging and steam shovel operations in the non-metallic mineral industries.

### Light Shovel Has Flexibility

An example of the tendency among many industries to use light machines to do small work is afforded by the Big Bend Coal and Clay Company. This company has strip mines in the vicinity of Centerpoint, Ind. They are primarily a mining company, and have large steam shovel equipment to strip the overburden from the coal. In addition, however, they make use of this overburden, deriving therefrom shale suitable for making brick,

fire clay and other varieties of clay which have several uses. All these products are sold in addition to the primary product—coal.

To handle the large variety of small work which is required in the process of separating and re-handling these materials, the Big Bend Coal and Clay Company purchased an Insley excavator. They use this small machine all over their property for such work as building and repairing roads, cleaning up slides which have covered tracks, stripping overburden from clay and mining the clay itself. One of the most unique accomplishments of this machine is loading fire clay into box cars. Fire clay cannot be shipped in open gondolas, as it must be kept dry. Previous to purchasing their Insley, the process of loading their box cars had been laborious and expensive. With their Insley, however, a half yard of material is picked up by the shovel bucket, is shoveled through the car door and dumped, being placed in the corner by hand.

The features of the Insley excavator which make it useful for the Big Bend Coal and Clay Company are its full crawler traction, which makes it easy to get about; its ease of operation, together with large daily capacity, and its low fuel consumption, which makes it economical to operate. These features make it possible for them to do a large variety of work over a large area, at a reasonable cost.



Insley Excavator at Big Bend Coal and Clay Mines

## Marion Development

An unusual shovel was introduced by the Marion Steam Shovel Company, which the manufacturer claims has the wide working range of large revolving shovels, the sturdy characteristics of the railroad models and the speed of the smaller types. This shovel is offered either with steam or electric power. The shovel can be equipped with either 35 foot boom, 22 foot dipper handle and 4 cubic yard dipper or a 45 foot boom, 30 foot dipper handle and three cubic yard dipper. Strength without excessive weight is obtained through alloy steel castings. The roller track, made of 80 pound rails, has a 16 foot diameter, and rests on the truck frame, which is covered with heavy plates. The double flanged alloy steel rollers are bushed and individually lubricated.

The lower frame is made of 30 inch I-beams, the main outside sills of the upper frame are of 24 inch I-beams and extend the full length. The steel cab is so built that the machinery, operator's station, boiler, piping, etc., are enclosed. The shovel is mounted on four crawling traction trucks, equalized through an alloy steel axle pivoted to one end of the truck frame. Jacks on equalizing truck enable the upper frame to be held rigid while the shovel is digging.

The Marion Ward-Leonard control is used with shunt wound, direct current motors. The motor generator set is a four unit outfit and the power for major operations is supplied through generators and motors. A flood system of lubrication is used.

## Illinois Contractors Meeting

The annual meeting of the Illinois Association of Highway and Municipal Contractors will be held at the Hotel La Salle, Chicago, December 16th and 17th. Frank T. Sheets, chief state highway engineer, will discuss administration problems at the first session directly after the address of James Cameron, president of the association. S. M. Williams, vice-president of the Autocar Company, will talk on establishing responsibility of construction at this session.

In the afternoon M. R. Henry, president of the associated equipment distributors, will discuss terms of payment for construction equipment and William McKinley will talk on "The Lien Law vs. The Responsible Contractor." This will be followed by a discussion of mutual problems of highway construction led by C. J. Moritz, C. M. Hathaway and Mr. Sheets. The Thursday morning session will be given over to talks by W. F. Hoyne on freight traffic as it affects the contractor, "Cost Accounting on Highway Work" by Ward P. Christie, and "Highway Construction and Highway Contractors" by A. R. Hurtz.

The afternoon meeting will be executive and the banquet will be held in the evening with A. O. Eberhart, former Governor of Minnesota, as the principal speaker.

The Maine Sand & Gravel Co., Portland, Me., capital \$150,000. Directors—George C. Owen, Edward S. Everett and Charles B. Dalton.



Marion Electric Shovel

## The Armstrong Drill and Bit Dresser

Outstanding among the developments in quarry machinery during the past year is the Armstrong No. 50-B Special blast hole drill, produced by the Armstrong Manufacturing Company, Waterloo, Iowa.

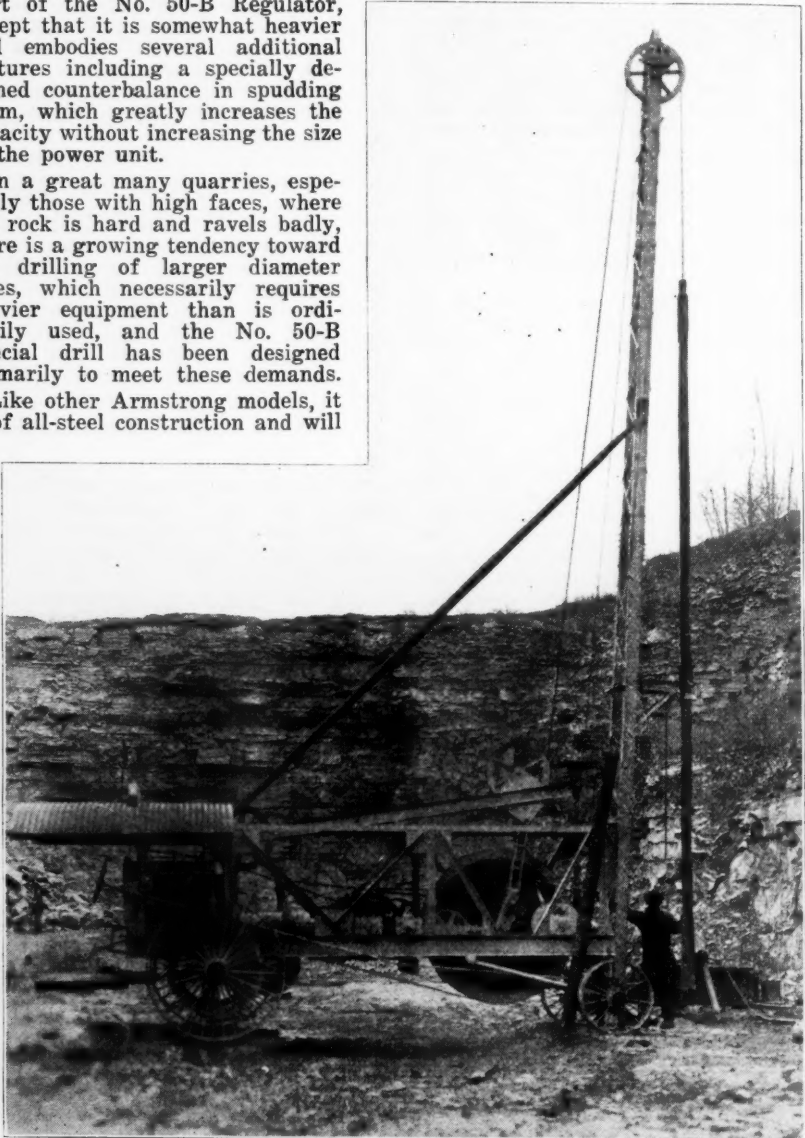
This machine is an exact counterpart of the No. 50-B Regulator, except that it is somewhat heavier and embodies several additional features including a specially designed counterbalance in spudding beam, which greatly increases the capacity without increasing the size of the power unit.

In a great many quarries, especially those with high faces, where the rock is hard and ravel badly, there is a growing tendency toward the drilling of larger diameter holes, which necessarily requires heavier equipment than is ordinarily used, and the No. 50-B Special drill has been designed primarily to meet these demands.

Like other Armstrong models, it is of all-steel construction and will

swing a 5x22 inch drill stem with 8 inch, 400 lb. bits at 60 strokes per minute, without vibration, as the patented wire line derrick completely absorbs the shock and vibration of the drilling motion.

The company also announces a new bit dressing machine for sharpening drill bits up to 8 inches in diameter.



Armstrong 50-B Special Blast Hole Drill



## P&H Excavator Developments

The P&H family of excavators has recently been enlarged by the development of a new half yard, full revolving gasoline or electric machine, mounted on corduroy traction and known as Model 204 and a heavy duty excavator, Model 207.

Both machines are designed and built by the Harnischfeger Corporation, Milwaukee, Wis., and resemble the other P&H models in that they involve the same general principles of construction and operation.

The power for Model 204 is supplied by a single gasoline motor, of the heavy duty, tractor type, developing 40 H.P. at 960 R.P.M. All power is transmitted through cut steel gears with the minimum number of reductions. The two main drums are independently mounted on separate shafts and are controlled by outside band clutches and brakes, the clutches being operated by power clutch control. The drums have a standard line speed of 110 feet per minute, but may be lagged to give higher speeds for certain work. Both the revolving frame and car body frame are of cast steel, in one piece. All shafts are turned and ground to

micrometer size and all bearings are provided with Alemite or pressure cup lubrication. The corduroy frames are heavy steel castings, which receive the weight of the machine from two heavy forged axles. The treads are non-cloggable and the tread rollers are swiveled in two directions to adjust to any irregularities of the ground. All gears are well guarded to protect the operator and the first reduction and travel gears are fully enclosed, running in oil. There are two travel speeds— $\frac{1}{4}$  and  $1\frac{3}{8}$  M.P.H.—forward and reverse. All steering is controlled from the operator's platform by use of a simple hand wheel. The main machinery and operator's platform are fully enclosed in an all-steel cab, provided with suitable doors and windows for care and operation.

This machine handles a  $\frac{1}{2}$  yard dragline or clamshell bucket on a 30 foot boom and has a rated lifting capacity of 13,000 lbs. at 10 foot radius, which is 75 per cent of its tipping capacity. The shovel is  $\frac{1}{2}$  yard capacity and of the standard P&H design, with an all-steel box section boom.

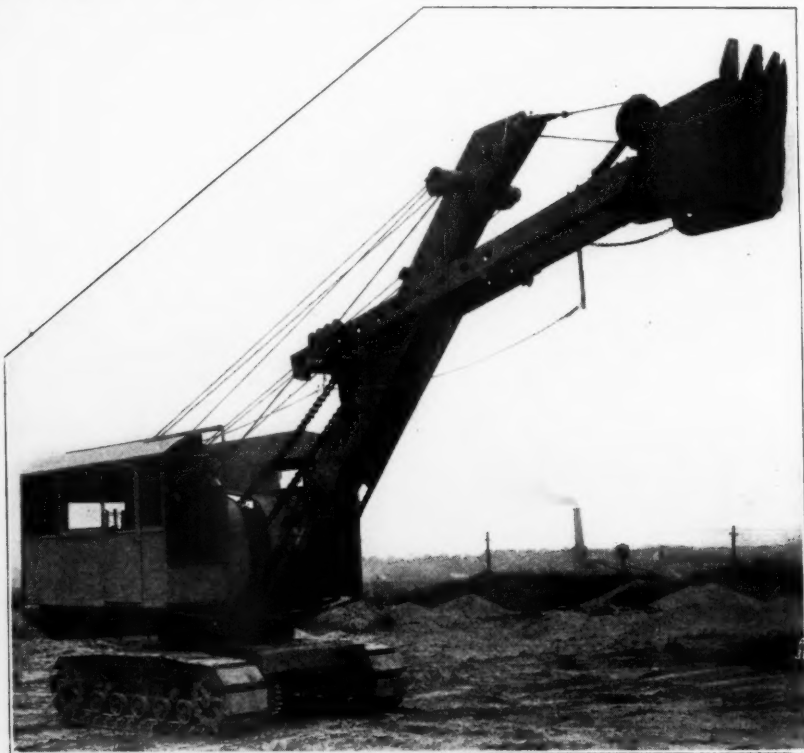


Model 204 Shovel, Harnischfeger Corporation

In the new Model 207 excavator power is supplied by a single gasoline, electric or Diesel motor of heavy duty tractor type, developing 77 H.P. All power is transmitted through cut steel gears with a minimum number of reductions. The two main drums are independently mounted on separate shafts and are controlled by outside band clutches and brakes, the clutches being operated by P&H power clutch control. The standard line speed for clamshell and shovel operation is 156 feet per minute and for dragline operation 116 feet per minute. The lagging on the front drum may be interchanged for toothed lagging when it is desired to use the shovel attachment. Both the revolving frame and car body frame are of cast steel, in one piece. All shafts are turned and ground to micrometer size and all bearings are provided with alemite or pressure cup lubrication. The corduroy frames are heavy steel castings which receive the weight of the machine from two heavy forged steel axles. The treads

are non-cloggable and the tread rollers are swiveled to adjust to the irregularities of the ground. All gears are well guarded for protection of machines and operator, and the first reduction and travel gears are fully enclosed, running in oil. There are two traction speeds, .4 and 1.22 miles per hour, forward and reverse. All steering is controlled from the operator's platform by use of a simple hand-wheel. The main machinery and operator's platform is fully enclosed in an all-steel cab provided with doors and windows to permit proper care and operation.

This machine handles a 1 cubic yard dragline or clamshell bucket on a 40 foot boom and has a rated lifting capacity of 33,000 pounds at a 10 foot radius based on 75 per cent of the tipping capacity. The shovel dipper is one cubic yard struck measure capacity and may be used on three different size combinations of shovel boom and dipper sticks to give various working clearances.



Harnischfeger 77 H.P. Shovel, Model 207



## Make bigger profits from sand and gravel!

**H**OW?—Wash, grade and deliver onto scow, car or truck, *all at one operation*—or at least *without a minute of lost time and without a wasted ounce of power.*

The Morris Hydraulic Method makes one job of everything from pick-up to shipment, takes fewer men, and eliminates the work that makes men do less when nobody is looking. Once the production rate of a Morris Pumping Outfit is established, you can safely figure on the same proportionate output every hour and if necessary every day of the month, as long as the supply bed lasts.

Those who own Morris Sand Pumps can almost invariably cut under price quotations of those who don't, and still come out with a fat profit.

Our Bulletin 20 is filled with profit-producing hints for sand and gravel producers, and our Engineers gladly offer free but valuable additional suggestions based on individual existing conditions.

**Morris Machine Works, Baldwinsville, N. Y.**

Originators of Centrifugal pumps, both single and multi-stage,  
and builders for practically all purposes since 1864.

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## CENTRIFUGAL PUMPS

## MACHINERY FOR SALE

## CRUSHING ROLLS

Two 16"x10", One 12"x24", Three 30"x10",  
Two 36"x16", Two 42"x16", and One 24"x  
54" Crushing Rolls. Swing hammer mills  
and other types.

## GYRATORY CRUSHERS

Two No. 3 Gates, One No. 4 Gates, Two No.  
5 Gates, Two No. 6 Gates & McCully, Two  
No. 7½ Gates and Austin, Three No. 8 Gates  
& Traylor, One No. 9 Gates Gyratory Crush-  
ers.

## JAW CRUSHERS

Three 9"x15", One 10"x20", Two 12"x24", One  
15"x30", One 18"x36", One 24"x36", One  
36"x42", and One 22"x50" Jaw Crushers.

## ROTARY CRUSHERS

Three No. 1, Two No. 1½ and One No. 2  
Sturtevant Rotary Fine Crushers.

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Two 3'x20', Three 4'x30', One 4½'x30', One  
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One 7'x60' Direct Heat Rotary Dryers. One  
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Coles type "A" and one 4'x20' Ruggles  
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One 4'x40', One 5'x50', Two 6'x60', One  
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- Large quantity late model American Stiff Leg Derricks, mast 14x14x40 ft., booms 14x14x60 ft., stiff legs 14x14x50 or 60 ft., sills if desired, with 12 ft. steel bull wheel, for hook work or bucket operation.
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- 1—Byers Auto Crane, 30-ft. boom, ¾-yd. bucket, traction wheels, steam.

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- 12—Three-Drum Hoists, with or without boilers. Sizes 10x12, 9x12, 9x10, 8¼x10 and 7x10, with separate swingers for derrick work. All makes.
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**'LOCOMOTIVES**

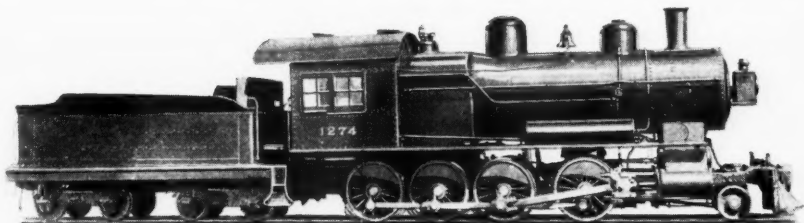
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Jaw Crushers  
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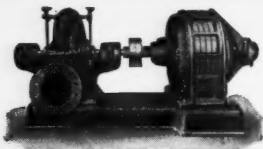
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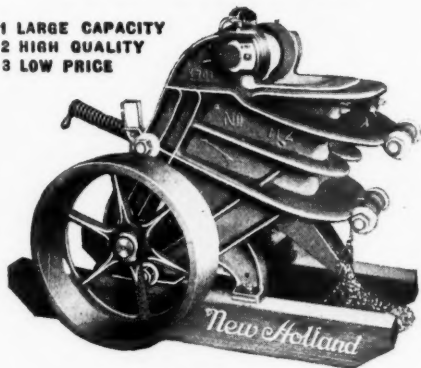


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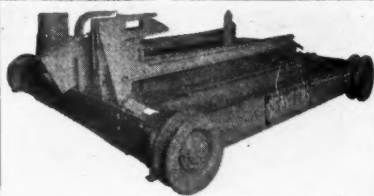
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**Quarry Car Dumper**

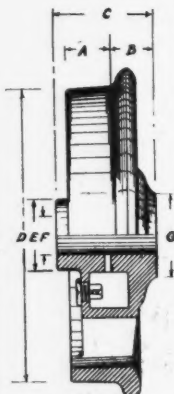


Used by the largest operators everywhere. The Quarry Car so interlocks with the car dumper that they are inseparable and constitute a safe and reliable unit during operation. The cars are of structural steel with large shafts, roller bearings and double flanged cast steel wheels. No additional power is necessary to operate. No time is lost in dislodging rock lost between the rails or in repairing broken rails and stringers.

Better let us send you full information, and start the new year without trouble at the dump.

**James B. Seaverns Company**  
 ENGINEERS, MANUFACTURERS  
 1315 South Oakley Avenue  
 CHICAGO

## EGYPTIAN QUARRY CAR WHEELS



NO. 100

are true to design and endure the most rough and abusive handling.

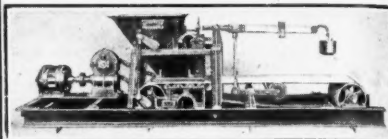
Style No. 100 has a large oil cavity so that the wheels are well supplied with oil without continuous attention, and the Spring Oilers permit the oiling to be done promptly and efficiently.

**EGYPTIAN IRON WORKS**  
MURPHYSBORO, ILL.

## NO SPRINGS

No delicate contrivances, yet a machine is not obtainable that will weigh more accurately than

## THE POIDOMETER



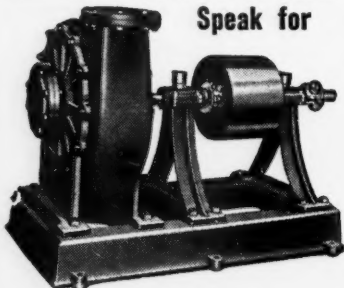
Weight against weight is the principle upon which it operates, and it is distinctly automatic in action.

Enables materials to be handled continuously or in bulk as desired.

Catalog sent on request

**SCHAFFER POIDOMETER CO.**  
2828 SMALLMAN STREET  
Pittsburgh, Pa.

## Sand and Gravel Producers Speak for



## The Lightning Pump

The Empire Sand and Gravel Company of Marshalltown, Iowa, says:

"This new pump has surprised all of us and we have had about fifteen years in actual experience in pumping sand and gravel. There are so many superior features about this pump that are not found in other pumps. viz., Such large capacity for so light and neat a design, its wonderful wearing qualities, its simplicity. It is only a few minutes work to unbolt and take it down and change any worn part and throw it right together again."

Full descriptive Bulletin on request.

**KANSAS CITY HAY PRESS  
CO.**  
KANSAS CITY, MISSOURI

## HIGH DUTY Magnetic Separators



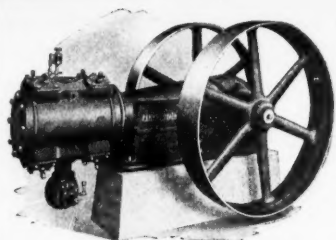
## Would You Throw a Wrench in the Gears?

Of course you wouldn't; no sane man would. Yet throwing a monkey wrench in the gears has the same ultimate end as operating a crusher without a High Duty Magnetic Pulley. The answer is expensive repair bills; repair bills that would have more than covered the cost of a High Duty Magnetic Pulley.

This inexpensive Magnetic device with its ventilation feature, increasing the magnetic power 25% to 50%, provides perfect safety even with peak loads.

Offices in principal cities  
See telephone directory

**MAGNETIC MFG. CO.**  
201-24th Ave. Milwaukee, Wis.

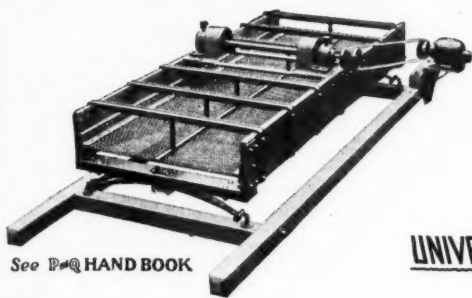


**PENNS  VANIA**  
**AIR COMPRESSORS**

The importance of selecting an Air Compressor that is always on the job, faithfully performing the service for which it was purchased, cannot be overstressed.

*Ask for bulletin 123-P*

**PENNSYLVANIA PUMP & COMPRESSOR CO.**  
 MAIN OFFICE AND WORKS, EASTON, PA.



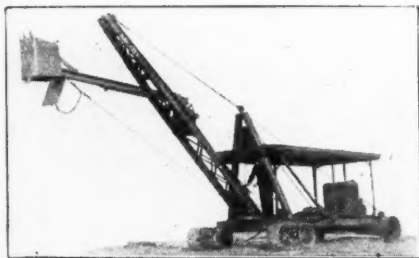
See P&Q HANDBOOK

**Universal Vibrators**

For the very highest screening efficiency with the lowest maintenance cost.

*Write for Descriptive Catalog Today*

**UNIVERSAL VIBRATING SCREEN CO.**  
 RACINE -- WISCONSIN



**BAY CITY ONE MAN EXCAVATOR**

**Operates Shovel—Clam—  
 Dragline 1/2-Yd. Capacity**

Fills the gap between hand labor and high priced equipment. Several hundred in operation, gasoline or electric power.

**BAY CITY DREDGE WORKS**  
 BAY CITY, MICH.  
 See P&Q HANDBOOK Page 333



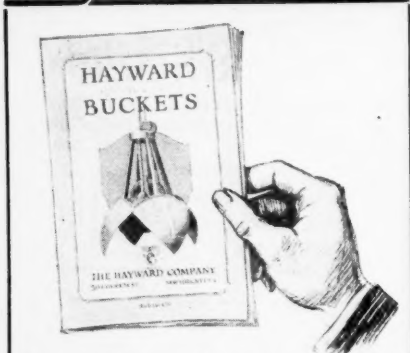
**Austin Portable Conveyors**

*Especially intended for handling gravel, stone, sand, and similar materials*

Made in two styles and all lengths between 16 and 68 ft. Furnished without power, or with gasoline or electric drive. Unmounted, or with 2 or 4 wheeled trucks as length requires. Write for special literature and prices.

**Austin Manufacturing Co.**  
 Chicago San Francisco New York

# Hayward Buckets



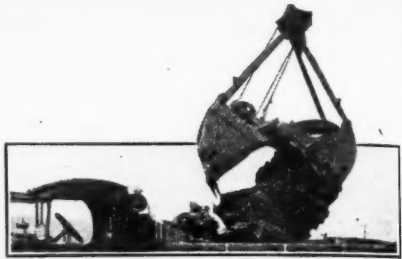
Up-to-date information on three models of Hayward Orange Peel Buckets. Just ask for a copy of Bulletin 655 and it will be forwarded promptly. Bulletins on other types of Hayward Buckets will be gladly supplied on request.

**THE HAYWARD COMPANY**  
54-56 Church St., New York, N. Y.

Builders of Clam Shell, Orange Peel, Drag Line and Electric Motor Buckets; Dredging, Exca-



vating, and Coal Handling Machinery; Counterweight Drums; Automatic Take-Up Reels.



## Dreadnaughts are Everywhere

You'll find Blaw-Knox Dreadnaughts railroading; contracting; road building; in steel mills—wherever clamshell work is being done.

Rehandling and digging costs are lower when Blaw-Knox Buckets are on the job.



**BLAW-KNOX CO.**  
Farmer's Bank Bldg.  
Pittsburgh, Pa.

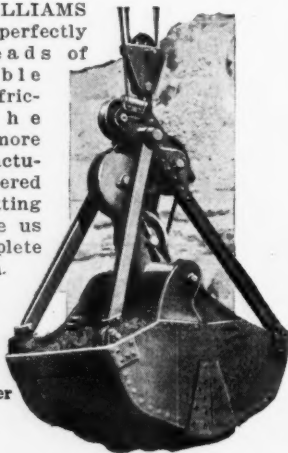


# BUCKETS

## More power

at the cutting lips

The WILLIAMS Bucket's perfectly straight leads of closing cable cut down friction at the sheaves—more power is actually delivered at the cutting lips. Write us for complete information.



G. H. WILLIAMS COMPANY  
605 Haybarger Lane,  
Erie, Pa.

Eastern Sales Office: 30 Church St., New York City

**WILLIAMS**  
FAST-DIGGING BUCKETS  
All Parts Guaranteed Against Breakage

# FLORY HOISTS

Flory Hoists, Cableways and Dredging Machinery are backed by 50 years of successful experience. They are built for hard work, are dependable, and very efficient in operation. Flory engineers will design a hoist for your special requirements if necessary.

STEAM—ELECTRIC—  
GASOLINE—BELT

See Catalog No. 31

**S. FLORY MFG. CO.**  
Bangor, Penna.



# TELSMITH

## A Specialist in Gravel Plant Machinery—

**WANT A CRUSHER?** The Telsmith Primary Breaker excels in crushing gravel boulders. The "parallel pinch" prevents slippage. Telsmith is equipped with steel frame, steel crown and rigid shaft—all guaranteed for two years, even against breakage by tramp iron.

**WANT A WASHER?** The Telsmith Heavy-duty Washing Screen washes and screens in one cylinder; saves headroom; saves floor space; saves water. It washes anything that is commercially washable.

**WANT A SAND TANK?** The Telsmith Tank is guaranteed to work automatically all day, every day, without labor or even supervision. De-waters within 25%, discharging only 5% free water.

**WANT A FEEDER?** The Telsmith Plate Feeder assures a steady flow of aggregate, increasing your daily output, improving your product, cutting your cost per yard. Adjustable for any desired yardage.

**WANT A COMPLETE PLANT?** The Telsmith organization offers you complete service, centralized responsibility, the best engineering experience, the guarantee of a strong, reliable company. Glad to send you bulletin No. GP-15.

### Smith Engineering Works

88 Lake Boulevard

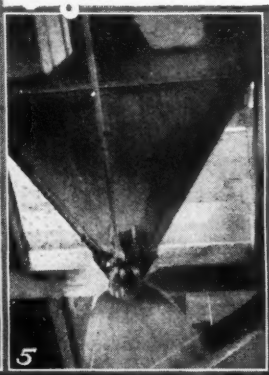
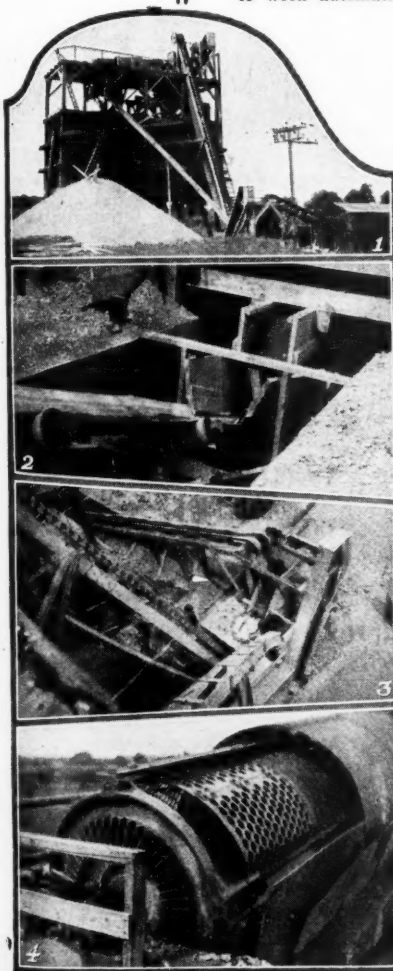
Milwaukee, Wis., U. S. A.

18 East 41st Street  
New York City

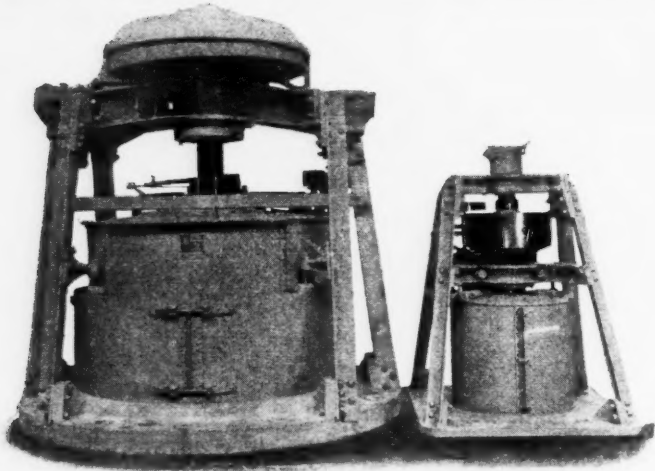
Old Colony Building  
Chicago

Beckwith Machinery  
Co., Pittsburgh  
and Cleveland

Selbert Milburn Co.,  
Columbus, O.  
Borchert-Ingersoll,  
Inc., St. Paul, Minn.  
J. W. Bartholow Co.,  
Dallas, Tex.



# PULVERIZERS



Bradley Hercules Mill

No. 24 Griffin Mill

## Pulverizing Machinery For Most Every Purpose—

For Cement Plants—Fertilizer Plants—  
Agricultural Limestone Plants, Etc.—Etc.

### *Reducing*

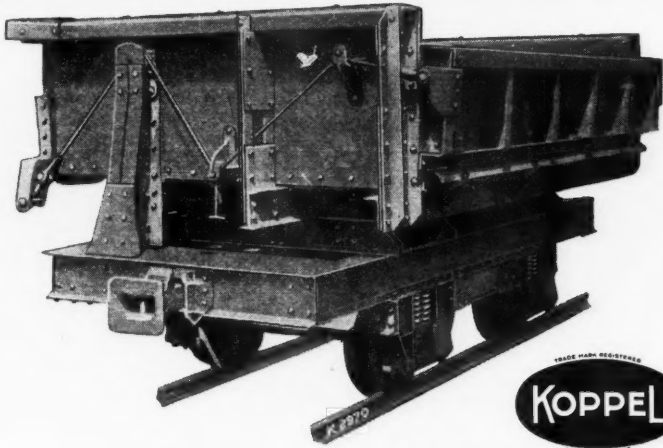
Cement Clinker—Cement Rock—Limestone—  
Phosphate Rock—Agricultural Limestone—Rock  
Dust for Mines—Gypsum—Etc., Etc.

**Out Puts—1-40 Tons per Hour**  
**Fineness—20-200 Mesh**

**BRADLEY PULVERIZER COMPANY**

BOSTON Works: ALLENTOWN, PA. LONDON





# THE KOPPEL DROP DOOR QUARRY CAR

Patented

The door operates as a chute—no obstructions of any kind—a quick clear discharge—typical Koppel construction. Made in various capacities—you'll like this car.

Ask for Bulletin No. 52-A

## Koppel Industrial Car & Equipment Co.

Koppel,

Penna.

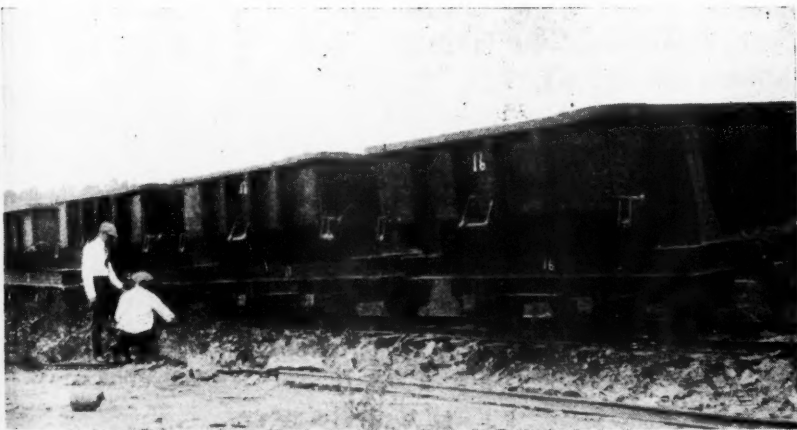
Pittsburgh

New York

Chicago

San Francisco

RAILS—SWITCHES—FROGS—TRACK



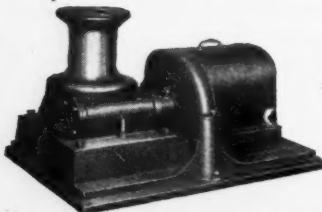
# MEAD-MORRISON



*Aerial Photograph Service, Inc.*

## Who Uses the Mead-Morrison Car Puller?

Two Car Pullers cut labor costs for the Manitowoc Portland Cement Company, Manitowoc, Wis., whose plant is shown above. Other users include the John Swenson Granite Co., Connecticut Quarries Co., Boston Sand & Gravel Company and hundreds of other well-known plants in a score of different industries.



**Mead-Morrison Electric Car Puller**  
No. 921. Moves cars ten times as fast as a spotting gang at the cost of only one laborer's time.

The new Bulletin (No. 129) shows the complete line of Mead-Morrison Car Pullers and the work each machine is designed to do best.

*Write for your copy*

**MEAD-MORRISON**  
MANUFACTURING COMPANY  
1228 PRESCOTT STREET  
EAST BOSTON, MASS.

**HOISTING - HAULING - HANDLING**

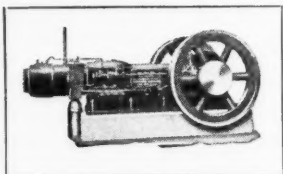
## How Is Your Equipment Standing Up?

If you have not tried **TISCO MANGANESE STEEL** you don't know the satisfaction of a dependable plant. You can cut repair bills and increase production by using it where the wear is hardest. In parts for shovels, crushers, screens, pumps, chutes, etc.

ASK THE MACHINE BUILDER FOR IT

**TAYLOR WHARTON IRON & STEEL CO.**  
HIGH BRIDGE, N. J.

## Buckeye Oil Engines Are Favorites



Single and two cylinder 55 to 260 H. P. Horizontal accessible design with adjustable cross-head.

Cost least for repairs.

Burns low grade fuel.

One gallon lubricating oil operates 90 h. p. for 33 hours.

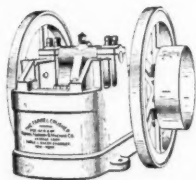
Write for catalogue.

**THE BUCKEYE MACHINE COMPANY**

**Lima, Ohio**

## "FARREL" CRUSHERS

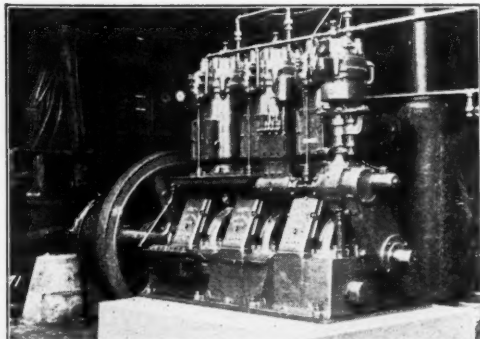
—World Famous—



Thousands in use on the hardest rock. Built in all sizes, 6"x3" to 60"x48". Complete rock crushing plants designed and equipped, also sand and gravel, washing and screening plants.

Send for latest bulletin E.

**Earle C. Bacon, Inc., Engineers, 26 Cortlandt St., New York**



TIPS OIL ENGINES burn low grade fuels. Solid Injection. 40—165 H.P. Sizes suitable for operating dragline excavators, hydraulic dredges and all stationary work. Variable speed, 100% water-cooled heads, no torches, Chrome-Vanadium crankshafts.

Write for Bulletin J-2

**TIPS ENGINE WORKS**  
**AUSTIN, TEXAS**

Agents in all principal cities

## Right Piston Action in Drilling

Your drill may be a hard hitter, but is it fast? Speed in drilling, and consequent results and bigger profits, depend on piston action. The Wood Drill is new and superior in the fact that the air which operates the piston in the Wood Drill escapes instantly after each trip, permitting constant rapid action. The improved steel puller will stand the heaviest strain. The whole cleaner operates perfectly. Better investigate!

*Send for full descriptive literature*

**WOOD DRILL WORKS, 30-36 Dale Ave., Paterson, N. J.**

*Makers of Hammer Drills and Piston Drills*



Crushing and Grinding

Material Handling

Old Equipment Modernized

Properties Examined

**C. H. SONNTAG**

*Engineer*

Cape Girardeau, Mo.

Portland Cement Plants

Electric Power Transmission

Power Plants

Waste Heat Boilers

## For Separating Dry Ground Materials

80 Mesh to 350 Mesh

# GAYCO CENTRIFUGAL SEPARATORS

Six Sizes—30 Inch to 14 Feet Diameter

**RUBERT M. GAY COMPANY, Inc. 114 Liberty St., N. Y.**

**McGANN MANUFACTURING COMPANY, INC.**

Engineers and Manufacturers

CHICAGO

YORK, PA.

NEW YORK

**THE SCHULTHESS HYDRATOR**— Built in all sizes to suit condition—Takes lime direct from the Kiln without crushing—lowest possible power required, about one-third the amount used by other Hydrators—Entire elimination of dust problem. *Put your Lime Problems up to us.*

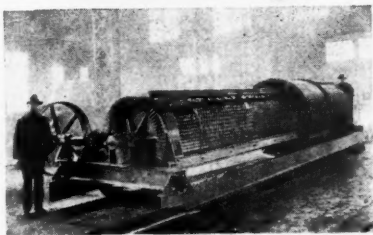


**YORK**  
Kilns

**SCHULTHESS**  
Hydrators

**YORK**  
Double Shell Dryers

## Hardinge Stone Screen



Extra heavy construction Designed for severe usage. Dust jackets supplied if desired.

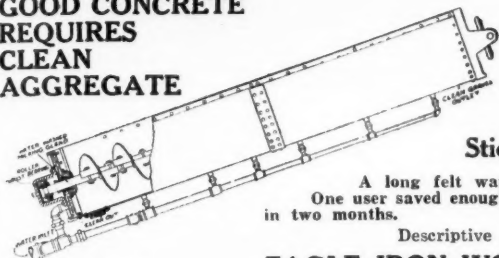
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**Hardinge Company, Inc.,**  
York, Pa.

120 Broadway  
New York

Newhouse Bldg.  
Salt Lake City

**GOOD CONCRETE  
REQUIRES  
CLEAN  
AGGREGATE**



## The EAGLE WASHER

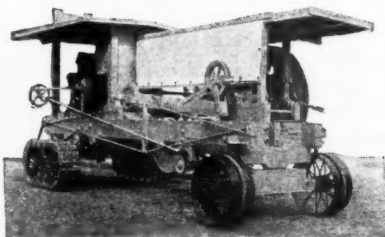
**Removes Mud Balls,  
Sticks, Coal and Shale.**

A long felt want that actually does the business. One user saved enough to pay for the cost of this washer in two months.

Descriptive Bulletin now ready.

**EAGLE IRON WORKS, Des Moines, Iowa**  
DEPT. P

Patent  
Applied for



## The "CLIPPER"

late improved Blast Hole Drill. The "CLIPPER" predominates, has stood the test, and is approved by critics. Furnished also in the round wheel.

(Established 1842)

**THE LOOMIS MACHINE CO.**

15 Market St., Tiffin, Ohio

## Milwaukee Gasoline Locomotives

*For Industrial Haulage*

Built in sizes from four to eighteen tons. For all Gauges of Track.

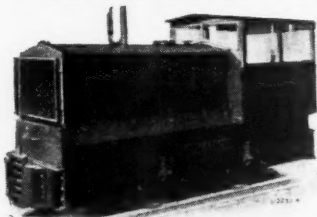
**FOUR SPEEDS—GEAR DRIVE**

There's a size for every purpose.

Write for catalogs M-129 and M-136

**MILWAUKEE LOCOMOTIVE MFG. CO.**

Milwaukee, Wis.

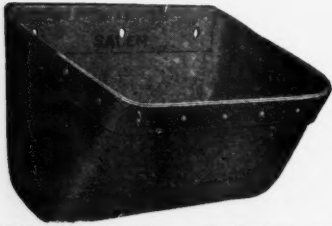


**SALEM**  
Genuine

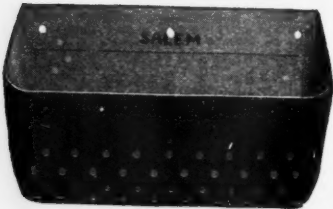
## Elevator Buckets

Since 1880, when Salem Buckets were awarded First Premium for superiority, no other make of bucket has approached the Salem in quality, long wear and unusual service. It is made in many different sizes and gauges of steel ranging from 24 gauge to 6 gauge, and is adaptable for handling materials of practically any size, shape or weight.

Our ability to furnish special buckets made up in accordance with your specifications enables us to offer excellent service and prompt delivery.



**Fig. 1080** Reinforced Edge. Particularly suitable to light or medium gauge buckets for handling abrasive or otherwise difficult material.



**Fig. 156** Perforated. For handling set substances which require draining during the elevating process. The perforations afford outlet for air and water in the "take" and facilitate delivery by inletting air when the bucket is inverted.



**Fig. 165** Reinforced Back. For very heavy work, when carried by the back or subject to severe strains.

Write for Catalog 3625

**MULLINS BODY CORP.**

Successor to  
**W. J. CLARK CO.**

106 Mill St., Salem, Ohio



FOR  
DRAG LINES  
POWER SHOVELS  
DERRICKS

AMERICAN  
STEEL & WIRE  
COMPANY

Chicago

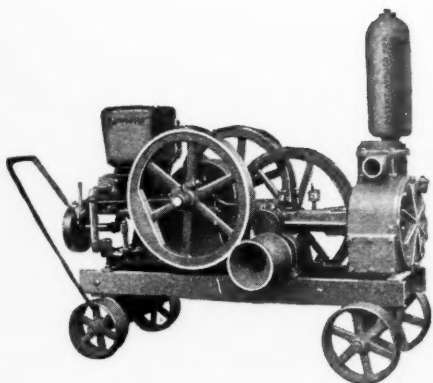
New York

# Mud, Sludge, Clay, Silt

All these elements are encountered in water pumped from quarry operations. The "Domestic" Pump will handle it.

The "Domestic" Pump has large capacity—80 to 150 gallons per minute—and will discharge through long pipe or hose-line without slop or odor.

Furnished with either one or two cylinder gasoline engine, or can be geared for electric motor drive.



"Domestic" 4-TF Double Acting Force Trench Pump Unit.

**Domestic Engine & Pump Co.**

*Manufacturers*

SHIPPENSBURG, PENNA.

DEPENDABLE



POWER UNITS

## EASTON TRAILER



FIG. 7473

**DOMINANCE** In every field of endeavor certain individuals, organizations, or products dominate. And dominance in every case, inspires confidence.

**EASTON CAR & CONSTRUCTION COMPANY**

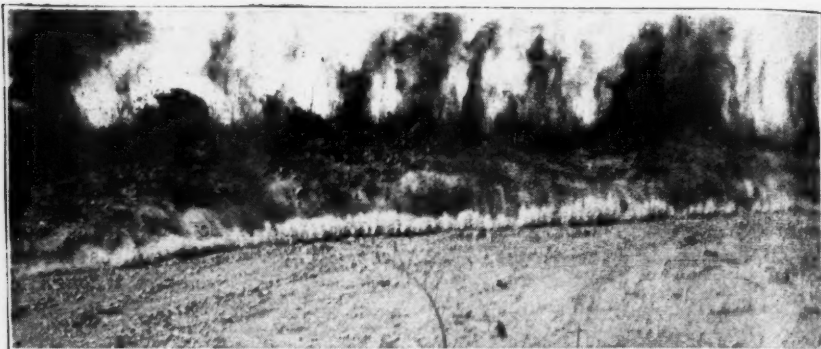
KANSAS CITY, MO.

Sales Offices: New York, Chicago, Pittsburgh, Philadelphia

EASTON, PENNSYLVANIA

# EASTON CARS

FOR EVERY PIT MINE & QUARRY



*Quarry face 1,600 feet long and 50 feet high being broken up by means of explosives detonated with Cordeau-Bickford*

For one or for two hundred drill holes, use the safe, sure, and efficient detonating agent, Cordeau-Bickford. Even though you have no power line, you can still shoot any number of holes you desire by using Cordeau-Bickford. Write for booklet today.

## The Ensign-Bickford Company

Original Manufacturers of Safety Fuse

Established 1836

SIMSBURY, CONNECTICUT

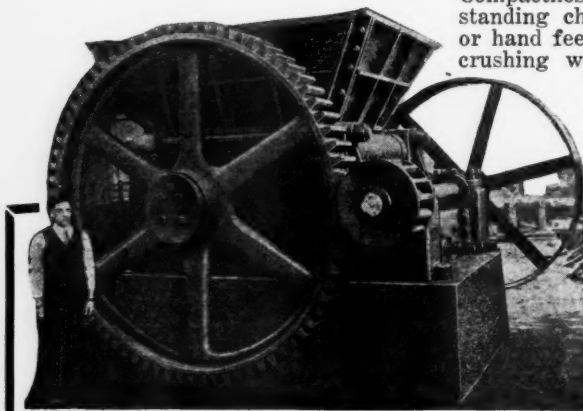
## Real Crusher Efficiency

McLanahan-Stone Single Roll Crushers have a reputation of many years standing in the field of primary and secondary crushing. There is no better crusher made for any material not harder than hard limestone and dolomite and not exceptionally high in silica.

Compactness and capacity are outstanding characteristics. No apron or hand feeding are necessary when crushing wet or slimy material.

### Other McLanahan Equipment

McLanahan Screens, Double-Log Washers, Elevators and Special Machinery. All our equipment conforms to the high standard of our Single Roll Crushers.



*Special machinery made from specifications and drawings to suit customers requirements.*

**McLANAHAN-STONE MACHINE CO.**

HOLLIDAYSBURG, PA.



## For Quarrymen Who Want to Know More About Drilling



A NEW 120-page edition of our book "Big Blast Hole Drills" is ready.

Half of this book consists of information on the drilling qualities of different rocks, methods of operation and cost data on drilling and blasting.

The balance of the book describes in detail the three sizes of Cyclone Big Blast Hole Drills, one of which will handle practically any quarry's drilling.

**The Sanderson-Cyclone Drill Co.**  
Orrville, Ohio

EASTERN AND EXPORT OFFICE:  
30 CHURCH ST., NEW YORK

*Your* output is increased  
pit labor reduced  
operating cost lowered

on every Railroad shovel that you mount on OSGOOD Continuous Treads or Traction Wheels—Write and we will refer you to users.

These facts will interest you:—

- Shovel free to move about the pit.
- No track, ties or other appliances.
- Only one or two men in the pit.
- Keeps close to working face.
- Low maintenance cost.

Bulletin No. 247 shows them at work. It's yours.  
Write for it.

**OSGOOD**  
Marion, O.



# BROWNING

## LOCOMOTIVE CRANES AND BUCKETS



**The Browning Crane Company**  
16226 Waterloo Rd., Cleveland, O.

### GRUENDLER PULVERIZERS

are demonstrating their economy of operation to many users. The low cost per ton of production together with the most uniform quality bear out the usual GRUENDLER performance and satisfaction.

Built in both stationary and portable types with capacities ranging from 1 ton to 15 tons per hour, they are a dividend paying investment.

Whether for use by builders, glass manufacturers, paper mills, the textile industry, or in agriculture, you will find the product of GRUENDLER pulverizers will bring you new customers at increased profit.

Write for Literature

### To Produce New Customers



**GRUENDLER** PATENT CRUSHER & PULVERIZER *Company*  
FIRST & FRANKLIN ST. LOUIS, MO.

# ELEVATORS, SCREENS

## Conveyors & Equipment



**W**HATEVER your needs in mechanical handling and screening equipment for sand-and-gravel or quarry plant, you will profit by getting in touch with this Company. We carry an extensive stock and shop facilities for turning out your needed equipment in short order.

In thinking of a new or enlarged plant you will want our Catalog 623 for ready reference. Ask for it.

Manufacturer of  
**THE GEORGE**  
Truck and  
Wagon Loaders  
Portable Belt  
Conveyors

# HAISS

Established 1892  
**MFG. CO. INC**  
Clam Shell  
Buckets  
Matl Handling  
Equipment

142nd St. and Rider Ave., New York, N. Y.

Representatives Throughout the World  
Cable Address "Coalhoist" New York—"Western Union  
5 Letter Edition" Code

## SPEARWELL MOGUL LOADER

**A Strictly One Man Machine**

**CAPACITY 1½ to 2½ CU. YDS. PER MINUTE**

**Weight 14,000 lbs.**

Equipped with positive and efficient excavating, feeding and cleanup device.

Clears path 8 feet wide.

Guaranteed to excavate harder material and to clean up better than any loader of its kind on the market, bar none.

40 H.P. 4 cyl. Heavy Duty Buda Motor.

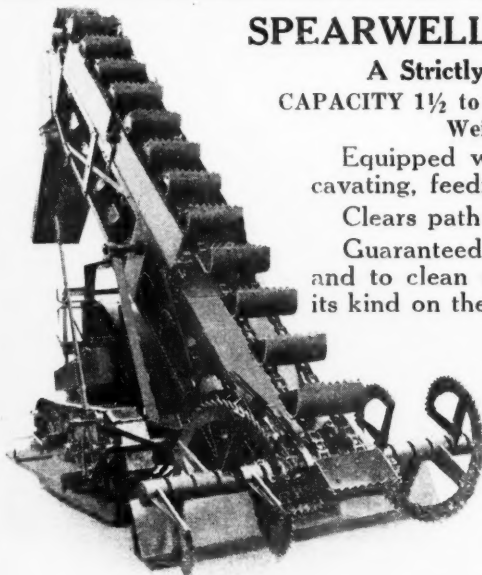
Positive self-cleaning track. 1500 square inches of bearing surface, less than 10 lbs. per square inch.

Digging and crowding speeds 4 and 20 ft. per minute. Traveling speeds ½ to 2½ miles per hour.

Digging position quickly and easily adjusted and absolutely maintained by special grade control shoe.

Swivel chute controlled from operator's platform, permits loading in any position.

Write for literature and prices on Spearwell Loaders—a size for every need.



**SPEARS-WELLS MACHINERY CO.**

Manufacturers of **SPEARWELL CONSTRUCTION EQUIPMENT**  
Oakland, California

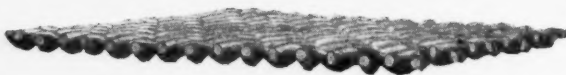
TRADE

ROL-MAN

MARK

## WOVEN MANGANESE STEEL SCREENS

Highest Efficiency—Greatest Economy—Longest Life



Note Face of Screen is flat

Both rods  
crimped pre-  
venting dis-  
placement.



Note closed  
double locked  
mesh.

Enlarged section through centre of mesh.

The Crimping is all on one side of screen. Makes wearing side smooth and flat. Will handle 50 to 100% more material than perforated plate.

Made in all shapes and sizes—Flat, Rolled to Circles or Cones.  
To Fit ANY Revolving, Shaking or Vibrating Screen.

### Manganese Steel Forge Co.

Richmond & Erie Ave.,  
PHILADELPHIA, PA.

Manufacturers of "ROL-MAN" Rolled and Forged Manganese Products

## DOUBLE CRIMPED WIRE CLOTH

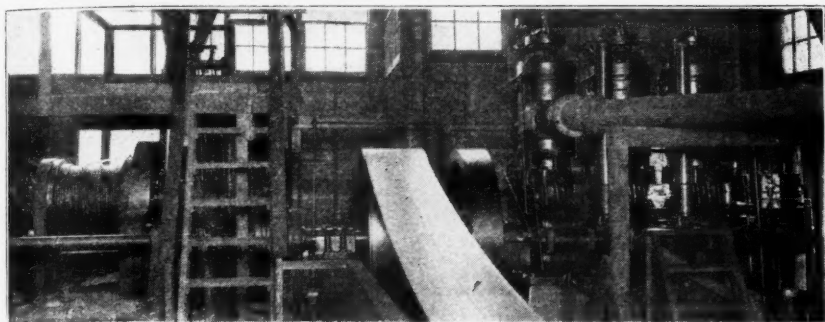


Send for  
Catalogue No. 47-E  
It lists a thousand screens.

### "Perfect" Service

- |   |      |            |
|---|------|------------|
| 1 | Most | COMPLETE   |
| 2 | Most | ACCESSIBLE |
| 3 | Most | RELIABLE   |
| 4 | Most | ADAPTABLE  |
| 5 | Most | ECONOMICAL |
- wire cloth SERVICE  
wire cloth SERVICE  
wire cloth SERVICE  
wire cloth SERVICE  
wire cloth SERVICE

The LUDLOW-SAYLOR WIRE COMPANY St. Louis  
610 South Newstead Avenue



OTISVILLE GRAVEL CO.

Otisville Gravel Co., when asked by us to wire a prospective customer opinion of their Venn-Severin Oil Engine, wrote:—

“You must have all kinds of confidence in your engine by asking us to do this without

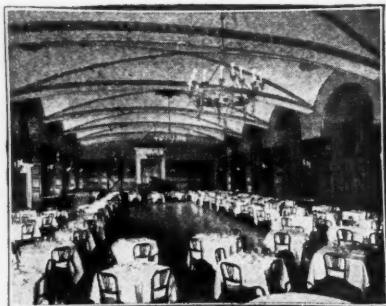
having heard from us regarding its performance since installation. We wired we were surprised to find it used less fuel and oil than claimed by your salesman. It is the first piece of machinery we have bought that does everything as represented.”

*Equal satisfaction assured for your power requirements.*

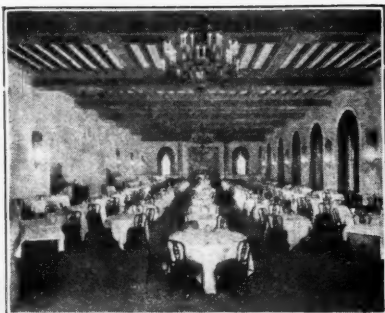
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1317 WEST NORTH AVENUE, CHICAGO, ILLINOIS

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The largest hotel in the British Empire extends a hospitable welcome to visitors. Here their every want is anticipated and the management lays especial stress upon personal service.

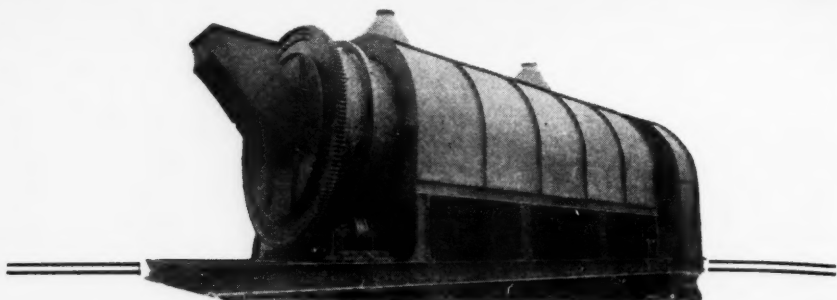


THE "SALLE DOREE"



MAIN DINING ROOM

**Mount  
Royal  
Hotel**  
MONTREAL



## ONE POUND PER CEMENT BAG

A reclamation of this amount of cement per bag enables the Continuous Cement Bag Cleaner to pay for itself after being in operation only a short time.

The process is simple and labor-saving in its performance and will efficiently clean and reclaim cement from 2,000 to 10,000 bags per hour.

Proof of the gratifying results obtained with the Continuous Cement Bag Cleaner lies in the number of modern mills now using it.

Write us for further information.

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### NAZARETH FOUNDRY AND MACHINE COMPANY

Works: Nazareth, Pa.

New York: 106 Front St.

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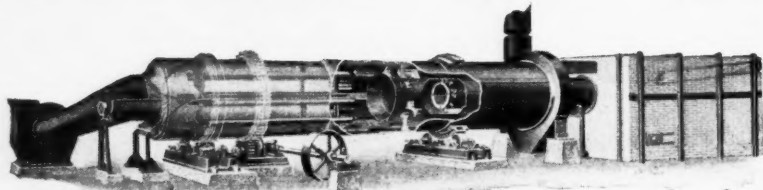


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## BUCKEYE DRYERS

FOR

**SAND — ROCK — COAL — CLAY**



**Buckeye Type B Dryer**  
Patented

The patented inner tube is responsible for the unvarying success of Buckeye Type B Dryers.

**DIRECT-INDIRECT FIRED USING COAL, COKE OR OIL  
RUGGED CONSTRUCTION—HEAVY DUTY SERVICE**

**ALSO**

**BUCKEYE "SPECIAL" DRYERS**

Semi-portable—Self-contained—Oil-fired—Direct Motor Drive. We ship the **SPECIAL** dryer assembled complete; set it on two concrete piers and it's ready to operate.

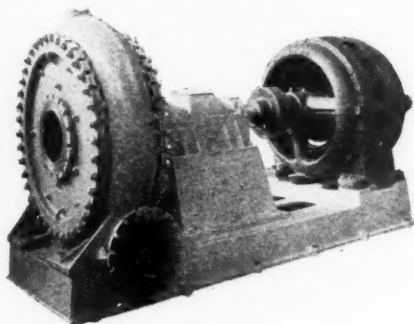
**THE BUCKEYE DRYER COMPANY**

1351 Railway Exchange Bldg.

Chicago, Ill.

# **PVC Manganese Steel Castings**

Our line of Manganese Steel Castings is complete. Prices reasonable.



## Research and Study have given Diamond Centrifugal Pumps

for Sand and Gravel operations serviceability and endurance. Constructed of Manganese Steel according to Correct Principles, they give real satisfaction.

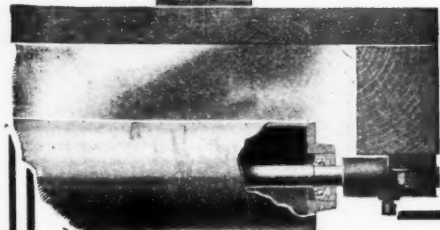
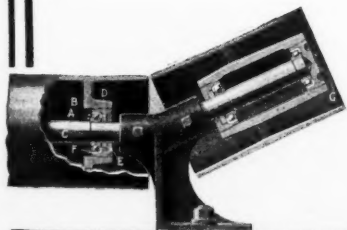
*Ask for details from*

**W. H. K. BENNETT**

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**PETTIBONE MULLIKEN CO.**  
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## You Need Conweigh Idlers To Reduce Idler Friction— To Increase Power



Eventually you will come to this improvement in your equipment because it is in the direct line of greater efficiency.

"Conweigh" Ball Bearing Troughing and Return Idlers give a smoother, easier service, and cause the belt conveyors to operate with far greater efficiency. Therefore you need them now.

"Conweigh" Ball Bearing Idlers give easy access for lubrication, are made of hardened steel, reduce Idler resistance and decrease power consumption.

Let us put detailed information on "Conweigh" Idlers in your hands. Write us today.

**THE CONVEYING WEIGHER COMPANY**

90 West Street

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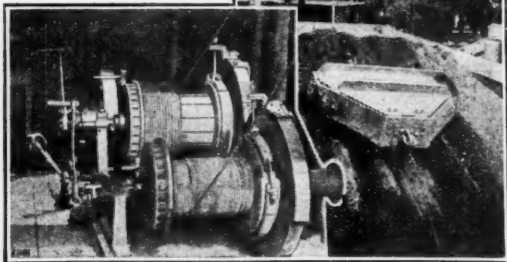
New York

# LIDGERWOOD HOISTS

*Electric—Gasoline—Steam*  
**on Dragline Scrapers**

Lidgerwood Electric Hoist operating a  $\frac{3}{4}$  yard scraper bucket at the plant of the Ashtabula Concrete Products Co., Ashtabula, O.

*A well designed outfit that increases output and profits from small pits.*



**LIDGERWOOD MFG. CO., 96 Liberty St., New York**

Chicago; Pittsburgh; Philadelphia, Columbus, O.; Los Angeles; Seattle; Tacoma; Portland, Ore. Brown-Marx Bldg., Birmingham, Ala. *Sales Agents:* Norman B. Livermore, San Francisco; Woodward Wight & Co., Ltd., New Orleans, La.; John D. Westbrook, Inc., Norfolk, Va.; Cameron & Barkley Co., Jacksonville, Miami, Tampa, Fla.; Canadian Allis Chalmers, Ltd., Toronto. *Foreign Offices:* Sao Paulo, Brazil; Rio de Janeiro, Brazil; London, England.

## "O. & S." Electric Hoists

Our line of Electric Hoists ranges in capacity from 350 to 6500 pounds on a Single Line. We furnish the Hoists with or without Motors. We use Motors of prominent make such as the General Electric, Westinghouse or their equal. The

Hoists are built in types necessary for all purposes.

Write for Bulletins Nos. 240, 267 and 268.

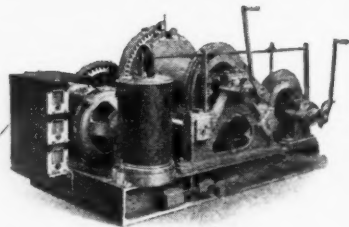
Manufactured by

**ORR & SEMBOWER, Inc.**  
**READING, PENNA.**

Established 1885

50 Church St.  
 NEW YORK CITY

208 N. Clinton St.  
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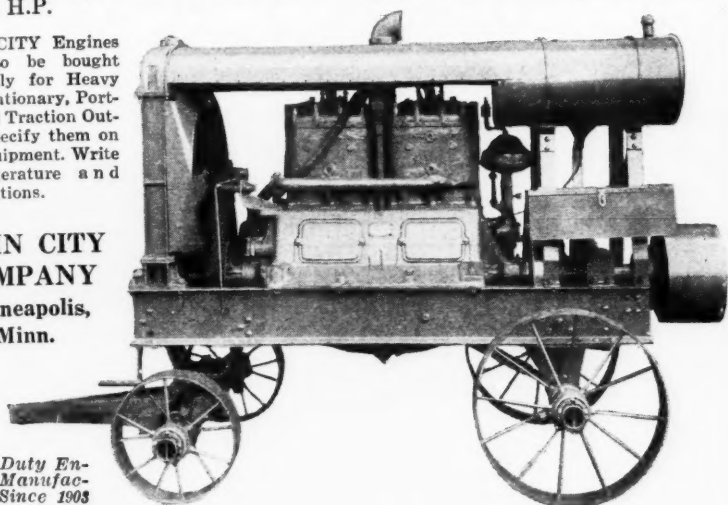


## Twin City Portable Power Unit

A sturdy, compact, easily transported outfit, built complete in our own shops. Equipped with TWIN CITY Engine. Manufactured in sizes 35 to 140 H.P.

TWIN CITY Engines can also be bought separately for Heavy Duty Stationary, Portable and Traction Outfits. Specify them on your equipment. Write for literature and specifications.

**TWIN CITY  
COMPANY**  
Minneapolis,  
Minn.



Heavy Duty En-  
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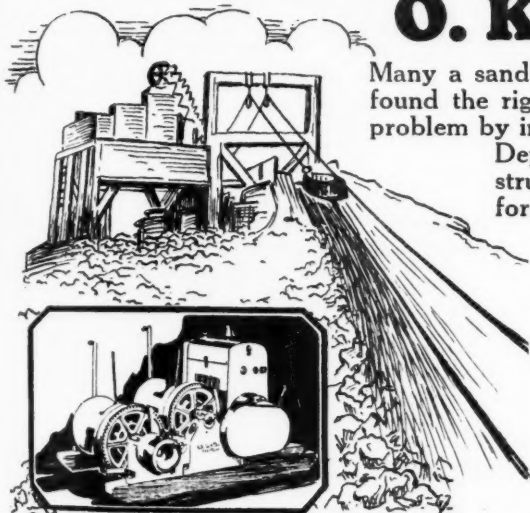
**"BUILT TO DO THE WORK"**

## Solve Your Hoisting Problem With an O. K. HOIST!

Many a sand and gravel operator has found the right answer to his hoisting problem by installing an O. K. Hoist.

Dependability, sturdy construction and consistent performance, light weight and easy portability, are O. K. qualities, and the qualities you want in your hoist. The O.K. HOIST stands up under hard service.

*Easily adjusted or repaired. Write for full information.*



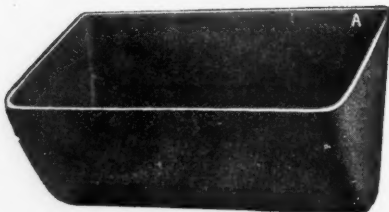
**O. K. CLUTCH & MACHINERY CO.**

BOX 305, COLUMBIA, PA.

# B-U-C-K-E-T-S

A complete line of buckets to suit all conditions.

Large stocks on hand.



Each representing the best in design, workmanship and material quality.

## For Elevating and Conveying

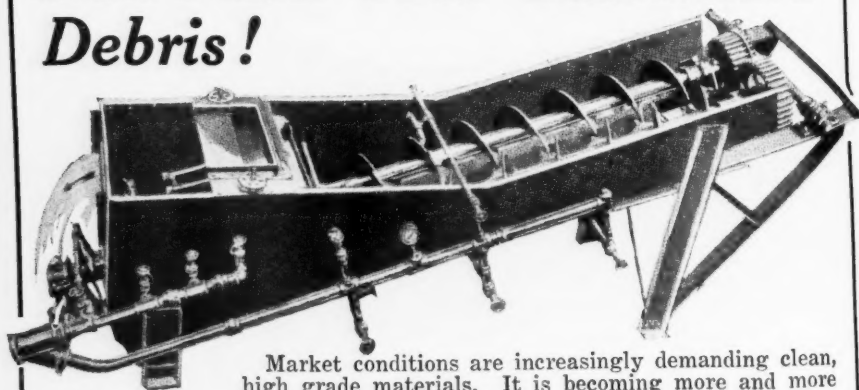
H. W. CALDWELL & SON CO.

LINK-BELT COMPANY, OWNER

Chicago, 1700 S. Western Ave.; New York, 2676 Woolworth Bldg.; Dallas, 810 Main St.

# CALDWELL

*Don't Sell Your Customers Debris!*



Market conditions are increasingly demanding clean, high grade materials. It is becoming more and more difficult to get business on a purely price basis.

### PERFECT CLASSIFIERS

will produce clean materials at all times, whether sand, gravel, limestone phosphate or coal is washed. And you can get more money for your product!

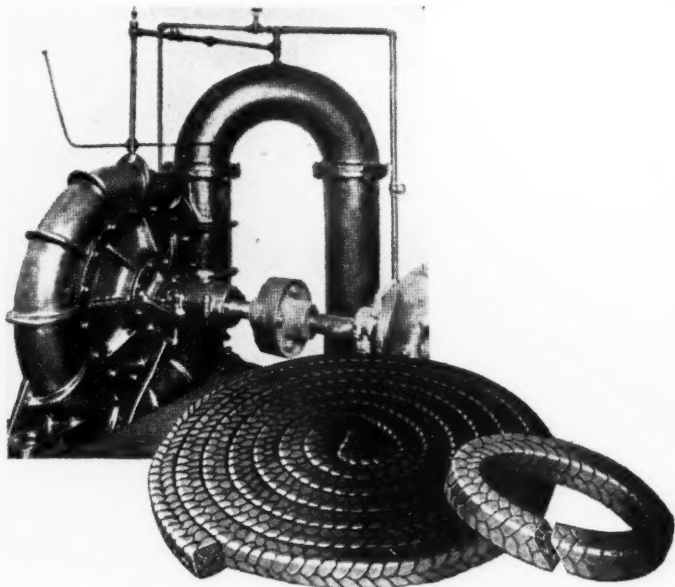
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### PERFECT CLASSIFIER COMPANY

Manufacturers of ORE CLASSIFYING MACHINERY

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## Cure centrifugal pump troubles with "U. S." 193

Cut down shaft friction in your centrifugal pumps and prevent cutting of sleeves of packing them with "U. S." 193 Centrifugal Pump Packing.

"U. S." 193 is especially designed for this service, and has made a reputation in many a pump room and power plant.

"U. S." 193 is easy to install, will not get hard and eliminates air pockets caused by leaking stuffing boxes. It gives satisfactory service at any pressure. It outlasts two sets of flax packings, because it will not carbonize. In quarry or gravel plant, where keeping sand and grit out of pumps is a difficult task, "U. S." 193 is at its best.

Write for further information on this and other "U. S." Packings.



Trade Mark

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1790 Broadway

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Branches in every industrial center

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Not to do the work of a large shovel — But to do the work  
a large shovel can't do — **PROFITABLY**



Three or Four Hundred Yards Per Day  
is a Whale of a Lot of Dirt

**S**UCH a yardage however is easy going for the Insley Excavator and it is logical for users of excavating equipment to ask themselves—why place a heavy investment in heavy equipment when the Insley will do the work?

THE INSLEY EXCAVATOR is a light machine, as excavating equipment goes, of comparatively low first cost.

Its design and construction are such that operating and maintenance costs are reduced to a minimum.

**Full Crawler Traction — Buda Power Plant  
Cut Gears — Low Center of Gravity — Roller Bearings**

It is a machine that you should investigate before excavating yourself for basement, road, quarry, ditching or general excavation work. Write for Bulletin No. 47.

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Excavating Equipment  
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